Mechanical Account

OF

POISONS

In Teveral

ESSAYS.

BY

RICHARD MEAD, M. D.

LONDON:

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PREFACE.

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O give an exact and particular Account of the Nature and Manner of acting of Poisons, is no easy Matter; but to Discourse more intelligibly of Them than Authors have hitherto done, not very difficult. One may without much Pains shew their Effects to be owing to something more than the bare Qualities of Heat or Cold; and discover the Foot steps of Mechanism in those surprising Phænomena which are commonly afcribed to some Occult or unknown Principle. But to unravel the Springs of the several Motions upon which

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which such Appearances do depend, and Trace up all the Symptoms to their first Causes, requires some Art as well as Labour; and that both upon the Account of the Exquisite Fineness, and Marvellous Composition of the Animal Machine in which they are Transacted, and of the Minuteness of those Bodies which have the Force to induce in it such sudden and Violent Alterations.

I have attempted somewhat this way in the following Essays; in which I do not promise Methodical, and Finish d Treatises, but only some short Hints of Natural History, and Rude Strokes of Reasoning, which if put together, and rightly improved, may perhaps serve to furnish out a more tolerable specimen of the Doctrine of Poisons

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fons than has been hither to Published.

The first Draught of this small Piece I made some Years since, Entertaining myself at leisure Hours with Experiments on Vipers, and other Venomous Creatures; Examining now and then the Texture of Arsenic, Mercury Sublimate, and the live Malignant Substances; turning over what Authors had said on the several Subjects, and making such Remarks as from time to time occurr d.

The secontinued Enquiries made up at last Three or Four short Discourses; which when I began to Digest into Order, the Increase of Business contracted the Intervals of my spare Time; and the Diversions of such Studies quickly

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giving way to the severity of more necessary Labours, they were quite thrown by. 'Till talking not long fince with Dr Areskine, concerning the Viper, I took occasion to review my scatter'd Papers, and confirm my Reasonings by new Experiments: He very readily offered me his Anatomical Observations, which I have put at the End of the First Effay. And as the Publick does every Day Profit by his Application to this part of Learning, which a wonderful Dexterity in Cutting, together with atrue Tafte of Philosophy and Physick, do declare him Born to improve and Advance to a far greater Pitch than it is yet arrived at; so these few Touches of Art will, I doubt not, raise in the Reader a Desire of Jeeing what he may some time or other expect from the same

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Hand, A compleat Anatomy of Serpents

Abbe Parts Michonsofthe I wide My Design in thinking of these Matters was, to try how far I could carry Mechanical Considerations, in accounting for those surprising Changes which Poisons make in an Animal Body; concluding (as I think fairly) that if fo abstrule Phænomena as these did come under the known Laws of Motion, it might very well be taken for granted, that the more obvious Appearances in the same Fabrick are owing to Juch Causes as are within the Reach of Geometrical Realoning. And that therefore as the first Step towards the Removal of a Disease is to know its Origin, so he is likely to be the best Physician, who having the same assistance of Observations and Histories with others A 4 month attor

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others, does best under stand the Humane OEconomy, the Texture of the Parts, Motions of the Fluids and the Power which other Bodies have to make Alterations in any of these.

Nor indeed ought any one to doubt of this who considers that the Animal Compages is not an irregular Mass, and disorderly Jumble of Atoms, but the Contrivance of Infinite Wisdom and Master-piece of that creating Power, who has been pleas' dto do all Things by established Laws and Rules, and that Harmony and Proportion should be the Beauty of all his Works.

It were therefore heartily to be wish d that those Gentlemen who are so much afraid of introducing Mathematical Studies, thatis, Demonstration

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monstration and Truth, into the Practice of Physick, were so far at least instructed in the necessary Disciplines, as to be able to pass a true fudgment what Progress and Advances may be made this Way: They would not then perhaps decry an Attempt of so much Moment to the Welfare of Mankind, as vain and impossible, because it is difficult, and requires Application and Pains.

It is very evident that all other Methods of improving Medicine have been found Ineffectual, by the Stand It has been at these Three or Four Thousand Tears; and that since of late Mathematicians have set Themselves to the Study of It, Men do already begin to Talk so Intelligibly and Comprehensibly, even about abstruse

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boped in a short Time, if Those who are Designed for this Profession, are early, while their Minds and Bodies are Patient of Labour and Toil, Initiated in the Knowledge of Numbers and Geometry, that Mathematical Learning will be the Distinguishing Mark of a Physician from a Quack; and that He who wants this necessary Qualification will be as Ridiculous as One without Greek or Latin.

I have as to what regards the Animal OEconomy Referr'd as much as I could to the Works of Bellini, which have brought great Light into the Dark Regions of Physick, and Taught Us to argue clearly and consistently instead of Amusing our selves with Unintelligible

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ligible Words or Precarious Hypotheses. The Differtations of Dr. Pitcarne, who is the Honour of his Profession in Scotland, are a convincing Proof of the Advantage of such a Mechanical Way of Reasoning; nor could Malice it self Deny This, were not Ignorance in Confederacy with It, which will secure any One from being Benisited by the most useful Demonstrations.

Notwithstanding This, I have been forc'd now and then to make Digressions from my Subject, to clear some Doctrines necessary to be known, which have not as yet been Explain d by Others. For indeed the Data from which We argue in these Matters are by many too few. Dr. Cheyne, the Author of the New Theory of Feyers,

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Fevers, but enumerated several Particulars in which the Theoretick Part of Medicine Still wants Improvement: If the/e Deficiencies were made good, We might with more Ease proceed in our Enquires into Humane Nature. And therefore as This requires no le/s a Genius than his own, equal-Is instructed in the most abstruse Parts of Geometry, and those other Studies which accomplish a Physician; so it makes Us, impatiently to expect his New Animal OEconomy, in which He will in a Short Time, not only fully Illustrate severalThings Hinted in the former Treatise, but Demonstrate many of the recited difficult Points; and convince the World, that the most useful of Arts, if duly cultivated, is more than either meer Conjecture, or base Empiricism:

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As to the Authors I have made use of who have Treated of Poisons, I have Quoted only those who Furnish'd Me with Matter of Fact; for there are but sew Originals; and very large Volumes on this Subject do many times contain little more than a Collection of Vulgar Errors.

I had once Thought to have carried these Searches farther; in Particular, besides what is occasionally mentioned in the last Estay concerning Insection in acute Diseases, to have enquired into the Nature of Contagious and Hereditary Distempers.

But the Humour of Scribbling would not hold out; and some perhaps will say, 'Tis well enough it didn't;

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didn't; for I am not Ignorant bow Few I am like to please, if it be bard to Think and Write Justly, 'tis harder yet to bring Others to one's own Taste; Nor Shall I be at all angry if to Many I have afforded Matter of Satyr and Invective; less Wit suffices for these than for the Di covery of Useful Truths.

They who have no Smattering of Mathematical Knowledge, are incompetent Judges of what Service I have done towards the Improvement of the Theory, or Practice of Medicine; and those who are acquainted with these Matters, will, it may be, Think it something to Talk Intelligibly on such difficult and abstruse Points.

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I neither want Applause nor fear Censure; and therefore be the Fate of these Papers what it will, as they were first Penn'd for my own Satisfaction, and innocent Entertainment; so I am resolved They shall never engage Me in the Trouble of Quarrels or Disputes,

An Appendix, containing Anatomical Objertuations on the Viyer, and an Account of Jome other Venomous Animals.

ESSAY II.

Of the Tarantula and Mad Dog.

Windship E.S.S.A.Y. III.

Of Poisonous Minerals and Plante.

AC TO E S S A Y IV.

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Fenomious Enhalations from the Earth,

Poisonous Airs, and Waters.

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The state of the s Year Cenfure; and thenefore be the Face of vis h Papers what it will, as they were first Pennid Refoloed They toull never engage We in Dell' X. A. & Buarrels or F the Viper. An Appendix, containing Anatomical Observations on the Viper, and an Account of some other Venomous Animals. FSSAY II. Of the Tarantula and Mad Dog. 55 ESSAY III. Of Poisonous Minerals and Plants. ESSAY IV. Of Opium. 127 ESSAY V. Of Venomous Exhalations from the Earth, Poisonous Airs, and Waters. 143

ESSAY the First.

Of the Linen

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People to this very Lay, for (A Velinging law many of 'BoH.T. AO Creatures in-

to their Houses, feed them and worthing the Top of Place The Very ancy all ans in the King of Calcut causes Cottages to be

HE Viper has always been so Notorious for its Venom, that the most remote Antiquity made it an Emblem of what is hurtful and destructive. Nay, so terrible was the Nature of these Creatures, that they were very commonly thought to be sent as Executioners of Divine Vengeance upon Mankind, for Enormous Crimes, which had escaped the Course of Common Justice. Thus Elian and Herodotus (b) do both take Notice that Adders were Sacred among the Egyptians; that they affirmed of one Sort of em particularly, that they were made to be Ministers of the Wills of the Gods, by averting Evil from Good

Men, and punishing the Bad. And Paufamius (c) observes of the Arabians, that they forbore offering any Violence to the Vipers which are found near to the Balfam-Tree, as reputing 'em Holy. The Footsteps of which Superstition do still remain among thele People to this very Day, for (d) Vestingius faw many of 'em take these Creatures into their Houses, feed them and worship them as the Genii of the Place. The same odd Fancy obtains in the East-Indies, for the King of Calicut causes Cottages to be fet up for Serpents to keep them from the Rain, and makes it Death to any that shall hurt one of them; thinking them to be Heavenly Spirits, because they can so suddenly kill Men (e). A remarkable Inflance of fuch an Opinion as this we have in the History of St. Paul (f), whom the People of Malta when they faw the Viper leap upon his Hand, presently concluded him to be a Murderer, and as readily made a God of him, when instead of having his Hand Inflamed, or falling down Dead, (one or other of which is usually the Effect of those

⁽c) Beotic. p. m. 303.

⁽d) Not. in. Alpin. de Plant. Egypt. Cap. 14.

⁽e) Purchase's Pilgrimage, 1. 5. c. 12.

⁽f) Act. Apost. Chap. 28.

Bites) he without any Harm shock the Beast into the Fire, It being Obvious enough to imagine, that he must stand in a near Relation at least to the Gods themselves, who could thus Command the Messengers of their Vengeance, and Counterwork the Effects of fuch powerful Agents.

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AND this, after the many Conjectures upon the Matter, seems to be the true Reafon why Antiquity not only Represented the First Masters of Physick, Hermes, Afeue lapius, Hippocrates, &c. in their Statues and Medals with a Viper added to their Figure, but also Worshipp'd them under this Form; for Diseases in those Days, especially the most Violent, Plagues, Fevers, &c. were in like manner, as these Creatures, reputed the Commission'd Messengers of Divine Anger and Displeasure (g). They therefore who by their Art could Cure and Stop the Course of These, as they are supposed to do this by the particular Leave and Affistance of Heaven, fo had Honours paid to them accordingly, and this Representation was in the Nature of an Hieroglyphick Character; for

⁽g) Leg. Cornel. Cell. præfat, in Medecin. Morbos ait vetustissimis temporib. ad Iram Deorum immortalium relatos esse & ab iisdem opem posci solitam.

as the learned Spanhem observes, (b) the Viper was a Symbol or Emblem of Divine Power.

Macrobius indeed gives us another Account of this Custom, and that is from the Property which all Serpents have of casting their Exuvix, or upper Skin, every Year, which makes em the Emblems or Representations of Health; the Recovery of which from Sickness and Diseases may justly be look'd upon as the Beginning of a fresh Period of Life, and (as the throwing of the Senessus of these Creatures seems to be) the renewing of Age (i).

WHETHER one or the other of these Reasons be allowed of, or both thought good, certain it is that such fond and superstitious Fancies concerning the Viper, together with the mistaken Opinion that sew of its Parts were exempt from Poison, did not suffer the Ancients to make any curious Enquiries into its Nature by Anatomy and Experiments; and this is the Cause of the

(b) Divinæ Potentiæ Symbolum. Vid. Ezec. Spanhem De Ulu Numismat. p. m. 125, 126, 181, & seq.

⁽i) Saturnal. Lib. 1. 20. Ideo Simulachris Eorum (Aculapii & Salutis) junguntur figura Draconum quia præstant ut humana corpora velut infirmitatis pelle deposita, ad pristinum revirescant vigorem, ut virescunt Dracones per annos singulos pelle senectutis exura.

many Errors they have delivered down to us in these Points, which by gradual Advance have since been rectified, and the inward Make, Properties, and Generation of this Animal largely treated of; more especially M. Redi (k), Charas (1), and Dr Tyfon in his Diffection of the Rattle-Snake (m), which is a larger Species of a Viper, have taken Pains on this Subject, to whose Difcoveries, what is yet wanting, we shall add at the End of this Essay.

THE Symptoms which follow upon the Bite of a Viper, when it fastens either one or both its greater Teeth in any Part of the Body, are an acute Pain in the Place wounded, with a Swelling at first red but afterwards livid, which by Degrees spreads farther to the neighbouring Parts with great Faintness, and a quick, tho' low, and fometimes interrupted Pulse, great Sickness at the Stomach, with bilious, convulfive Vomitings, cold Sweats, and fometimes Pains about the Navel; and if the Cure be not speedy, Death itself, unless the Strength

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⁽k) Offervazioni intorno alle Vipere.

⁽¹⁾ Nouvelles Experiences fur la Vipere.

⁽m) Philosophical Transaction, Vol. XII. No. 144-

of Nature prove sufficient to overcome these Disorders; and tho it does, the Swelling still continues inslamed for some time; nay, in some Cases more considerably upon the abating of the other Symptoms than at the Beginning; and often from the small Wound runs a sanious Liquor, and little Pustules are raised about it; the Colour of the whole Skin is changed Yellow, as if the Patient had the Jaundice.

THESE Mischiefs, altho' different Climates, Season of the Year more or less Hot, the greater or lesser Rage of the Viper, the Beast it self of a larger or smaller Size, and consequently able to communicate more or less Venom, and the like Circumstances, may variously heighten or abate 'em, yet do usually discover themselves much after the same Manner in all; unless the Bite happen not to be accompanied with the Effusion of that Liquor, which is the main Instrument and Cause of this violent and shocking Disturbance.

Bur before I proceed to enquire into the Nature and Manner of Acting of this Juice, it may be worth the while to take Notice, that this is not made on purpose to be deadly and destructive to Mankind; but that the true Design of it is (tho' Authors have not regarded

regarded it) to perform an Office and Service of fo great Moment, to the Prefervation of the Individual, that without it this Creature could not fubfift , which have need nist en get

For Vipers live chiefly upon Lizzards. Frogs, Toads, Mice, Moles, and the like Animals, which they do not chew, but fwallow down whole, and they lie in the Stomach; or if that be not big enough to receive them, partly in that, and partly in the OEfophagus, which is membranous, and capable of great Diffension, till by the Salival Juices of those Parts, together with the Help of the Fibres of the Stomach, and the contraction of the Muscles of the Abdomen, they are gradually. dissolved into a Fluid Substance, fit for the Nourishment of their Bodies, which is the Work of many Days; this is one Reason why these Creatures can live so long without taking any fresh Food, which I have known them to do Three or Four Months; as another is that their Blood is a groffer and more viscid Fluid than that of most other Animals; fo, that there is but a very little Expence of it by Transpiration, and consequently less need of Recruit; this not only Microscopes difcover but Reason teaches; because there is but very little Muscular Force in the Stomach to comminute the Food, and make a Chyleof B 4

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of fine Parts, and therefore the Blood must accordingly be of a Tough and Clammy Confistence. Now such a manner of Feeding as this does necessarily require that the Prev should upon the first Catching be immediately Kill'd, otherwise it were by no Means fit to be let into the Stomach; for we are not to think that the Force of this Part would be alone fufficient to deftroy it. the Subtilty of a living Creature (besides the Confideration of the Weakness of the Fibres) being in a great Measure able to elude that as indeed we do every Day find live Animals in the Ventricles of others; and therefore to do this is the proper use both of the Teeth and their Poison; for which being defigned and adapted, it is no Wonder if the Viper this same way by which it destroys its Prey, proves fometimes Mischievous to any other Creature besides, when it happens to be enraged, or by any Provocation stirr'd up to Bite.

The Description of the Poisonous Fangs, their Make, Articulation and Motion, as also of the Glands that separate the Yellowish Liquor, and the Bags that contain it, I shall give together with some Anatomical Observations, at the End of this Discourses and the End of this Discourses are the End of this Discourses and the End of this Discourses and the End of this Discourses are the End of this Discourses and the End of this Discourses are the End of this Discour

THIS Venomous Tuice it felf is of fo inconfiderable a quantity, that it is no more than one good Drop that does the Execution; and for this reason Authors have contented themselves with Trials of the Bite upon several Animals, never Effaving to examine the Texture and Make of the Liquor it felf; for which Purpose I have oftentimes by holding a Viper advantageoufly, and enraging it till it ftruck out its Teeth, made it to bite upon somewhat solid, so as to avoid its Poifon; which carefully putting upon a Glass Plate, I have with a Microscope, as nicely as I could, view'd its Parts and Composition.

UPON the first Sight I could discover nothing but a Parcel of small Salts nimbly floating in the Liquor, but in a very short time the Appearance was changed, and these faline Particles were now shot out as it were into Crystals of an incredible Tenuity and Sharpness, with something like Knots here and there, from which they feemed to proceed; fo that the whole Texture did in a manner represent a Spider's Webb; tho' infinitely finer and more minute; and yet withal fo rigid were these pellucid Spicula or Darts, that they remained unalter'd upon my Glass for feveral Months (n).

. I have made feveral Trials with this Taice in order to find out under what Tribe of Salts. these Crystalsare to be ranged and not without some Difficulty, by reason of the minute: quantity of the Liquor, and the Hazard of Experiments of this Nature, have plainly feen that it does, as an Acid, turn the Blue Tincture of Heliotropium to a Red Colour.

I did not fucceed fo well in mixing it with Syrup of Violets, and yet it did really feem to induce in this a Reddiff Hue; but I am very certain it did not at all change it to a Greenish Colour, as it would have done if I cli b water thloop been

any ways Alcalious.

THIS may suffice in their own way of arguing to convince those Gentlemen, who without the Affiftance of any Experiments, meerly to ferve an Hypothesis which they have too fondly taken up, have with great Assurance told the World, that the Viperine Venom is an Alcali, and consequently to be cured by Acid Remedies. But it is by far more easy to spin out a false Notion into precarious Reasonings, than to make faithful Experiments, and fairly improve 'em by just and necessary Consequences.

To proceed, this Discovery agrees very well with a Relation communicated by an Ingenious Person to Dr. Tyson, which does fo much Illustrate this Matter, that I shall Transcribe it in his own Words out of the before cited Philosophical Transactions; he fays then, that being in the Indies, there came to him an Indian with leveral Sorts of Serpents, offering to shew him some Experiments, about the Force of their Poiton; having therefore first pull'd out a large One the Indian told him this would do no harm; and making a Ligature on his Arm as in letting Blood, he exposed it naked to the Serpent, being first irritated to make him bite it, the Blood that came out of the Wound made by his Teeth, he gather d with his Finger, and laid it on his Thigh, till he got near a Spoonful; after this he takes out another called Cobra de Capelo, which was leffer, and enlarges much upon the greatness of this Poison; to shew an Inflance for it, grasping it about the Neck, he expresses some of the Liquor in the Bags of the Gums, about the Quantity of half a Grain, and this he puts to the coagulated Blood on his Thigh, which immediately put it into a great Fermentation, and working like Barme, changed it into a Yellowifb Liquor.

This I say does well enough accord with what we have been advancing concern-

ing the Nature of this Juice; for Mr. Boyle, has long fince proved by Experiments, that there is nothing of Acid in Human Blood; and Dr. Pitcarn (o) has demonstrated, that the Acid Substances of Vegetables taken into the Stomach, are by the Action of this Part, the Lungs and Heart, when they come into the Blood-Vessels, turn'd to Alcalious; so that the Arterial Fluid must neces-farily be considered as an Alcali; and therefore according to the known Principals of Chymistry, its Mixture with fuch a Liquor as we have discovered the Viperine Sanies to be, will always exhibit fome fuch appearance as this now related.

Bur not to engage any farther in these Sort of Controversies, we may perhaps from the foregoing Observations receive some Light, in order to understand the Nature and Reason of all those Symptoms which attend the Bite of this Creature. For the pungent Salts of this Venom, when with force thrown into the Wound, will not only as fo many Stimuli, irritate and fret the sensile Membranes, whereupon there necessarily follows a greater Afflux than ordinary of the Ani-

⁽o) Dissertatio de Opera quam præstant corpora acida vel Alcalica in curatione morborum. lemi we have been advantermy

mal Juice that way, (as is manifelt from the Bellinian Doctrine, De Stimulis) so that the wounded Part must be swell'd, inflamed, linvid, &c. but also these Spicula being mit'd with the Blood, will so disjoin and disunite the Parts of it, that its Mixture must be quite altered; and from the various Coheson of its Globules will rise such different Degrees of Fluidity and Impulse towards the Parts, &c. from what this Liquor had before, that its very Nature will be changed, or in the common way of speaking it will be truly and really Fermented.

To understand aright how all this is done, it is necessary to hint something concerning the Nature of Fluids in General, and those Alterations in them which we call Fermentations; for I shall retain this known Word, tho' in the proper Sense in which 'tis commonly used, there can be no Fermenting of the Liquors in the Animal Body.

And here I must refer to the Treatise of Bellini de Fermentis, who has with great Clearness shewh, that there is in all Fluids not only a simple Contast of their Parts, but also a nisus in contastum, or Cohasion, and this of a certain Degree or Force, and besides, of a particular Direction; which is indeed, though express'd in other Words,

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the very same thing with the Attraction of the Particles one to another; this Mr. Newton has demonstrated to be the great Principal of Action in the Universe, has taught us the Laws of it in the greater Quantities and Collections of Matter; and he who rightly studies his Philosophy, will understand that the same obtains in the most minute and finest Corpuscles, which do Unite into Bodies of different Solidity and Make, according to the Degree with which they do mutually aurast each other, and to the Super. fices, by which, when drawn, they do touch and adbere. To this if we add a Pression of the feveral Parts of the Fluid, perpendicular to the Sides of the Vessel, in which it is contained; and confider withal, that this uniform Attraction of the Parts to one another must be variously changed by the different Attraction of Heterogeneous Bodies mix'd with them, we have the great Principles of all Fluids upon which their feveral Phenomena do depend.

AND hence it follows, that what sever Power is sufficent to make a Change in this Attraction, or Cohasion of the Parts, makes an Alteration of the Nature of the Fluid; that is, as the Chymists express it, puts it into a Fermentation. And if any one shall think

think it necessary to enquire into the particular Manner of producing fuch an Effect, we may perhaps in so abstruse a Matternot improbly conjecture thus, That our Blood confisting chiefly of Two Parts, a simple Lymph, and an infinite Number of small Globules, containing a very fubtile and elaflic Fluid, these acute Salts, when mingled with it, do prick those Globules, or Vehcule, and fo let out their imprisoned active Substance, which expanding it self every way, must necessarily be the Instrument of this speedy Alteration and Change (p). From fuch an Hypothefis as this (and, it may be not very eafily from any other) we may account for many of the furprizing Phænomena in the Fermentations of Liquors; and as precarious as it feems, its Simplicity, and Plainess, and Agreement with the forementioned Doctrine, will, I believe, recommend it before any other to those who are not unacquainted with Geometrical Reasonings. But I wave these Considerations at present, and shall only add one Remark or Two with Relation to the Purpose in Hand, and To proceed. Antimals, agone would

In the first Place then, we may, from this Theory, learn, how it comes to pass

⁽p) Vid. Bernoulli de Effervescentia & Fermentatione

take so small a Portion of Juice should infect so great a Quantity of Liquor; for in order to do this, its not necessary that the Venom should be at the very first mixt with all its Parts; but it is sufficient that it prick some of the Bladders, and the elastic Matter of these being let out, will be a nimble Vehicle to the acute Salts, and not only by its Activity disperse them through the Fluid, but restore them to their decreasing Force, and thus continue their Effects, till a great Part of the Liquor undergoes at least, in some Degree, the like Alteration.

AND this will the more easily happen in the present Case, because the Force with which this Poison is thrown into the Blood (as appears from the Mechanism of the discharging Organs) is very great, and consequently its Effects will be proportionably violent, or the Mischief more large and dis-

fuled.

The want of this may be one Reason why the Experiment of first making a Wound in the Flesh with any sharp Instrument, and then dropping in the Sanies, may not always succeed so well in killing Animals, as one would from the preceeding Doctrine be ready to expect. Tho if some amends be made for this Desect, by

taking a great quantity of the Juice, and carefully Instilling it, it proves equally Fatal this way, as when immediately difcharged from the Viper it felf. Thus it might happen that those Trials of this kind which were happily made by Seignior Redi. might not however convince Mr. Charas, in as much as there is oftentimes a great deal of Difference in the Event of Experiments, when made with Purpose and a Design that they should Succeed, and when Timoroufly and Cautioufly managed, left they should unluckily overthrow a darling Hybeing thus la oken, thole Parts of it siladtog

THE other Observation I shall draw from the foregoing Theory is this. That it appears from hence what a vaft variety there may be in the Fermentations even of one and the same Fluid; for these being no other than Changes made in the Cobesion of the compounding Particles, are capable of as many Alterations as Motion in its Degrees and Directions can admit of which are really infinite your good morgany aids saids

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This I mention with regard to fome of the following Esfays, in which if we ascribe many Symptoms feemingly very different, to a Ferment raised in the Blood, it may be confidered that the Nature of this Caule is such, as according to the several Properties of the Primum Agens, or Fermenting Power, to bear by far more varieties than any one can be aware of.

To return to the Viper, the Effects of fuch an Agitation of the Blood as we have been describing, must not only be whatever are the Confequences of a disturbed Circulation, and irregular and interrupted Secretion of the Spirits, as low Pulle, Faintings. Sickness, Palpitation of the Heart. Convultive Vomitings, Tremblings of the Body. &c. but also the Texture of this Fluid being thus broken, those Parts of it which are of flowest Motion, and greatest Viscidity, will be eafily separated from the others; fuch they are, which when united together do compound the Bile, and therefore thefe will Tinge the capillary Veffels, and fine Dutts in the Skin, with a Yellowish Colour ; that is, will induce an Idenus or Jaundice.

For it is not only (if at all Primarily) from an Obstruction of the Biliary Canals that this Symptom does proceed, but also from any Cause whatsoever which either destroys the Saline Part of the Bile, by the means of which its Oil is kept Mixt with the Water of the Blood, or else increases the Oily and Sulphurous Part to that Degree, that

that tho' it be duly impregnated with Salt, yet the Watery part of the Blood, which can only take up a certain Proportion of it, being already Saturated, can receive no more; or lastly, does by disunting the compounding Particles of the Blood, alter that Intestine Motion and Agitation which is necessary to carry along thro' the Vessels, together with the more Volatile Parts, those which are more Clammy and Gluttinous. For in all these Cases' tis plain that the Bilious Corpuscles must be pracipitated upon those Parts of the Body where there is least Motion, that is, upon the extream Superficies.

And the this Theory may perhaps appear Extravagant, because new and uncommon, yet it will not, I believe, seem ill grounded or irrational to those who understand the Doctrine of the Mixture of Heterogene Fluids, and their Separation; and who withal know, that the Vessels are rarely obstructed, unless it be from the fault of the Liquid they carry, and consequently that a Defect in the Bile itself must be (excepting some extraordinary Cases) antecedent to the Obstruction of the Biliary Ducts.

In short, the different Cure of this Disease confirms these Notions; for an Icterus

from the first Cause assigned, which is generally owing to a Sedentary Life, want of Exercise, &c. and attended with an extream Costiveness and white Faces, is cured by Volatile, Acrimonious and Bitter Salts. From the Second, produced oftentimes by Drinking strong Liquors, Spirits, &c. and accompanied with a Diarrhaa, partly by Diluting and Temperating, partly by Stomachick and Strengthning Medicines. As the last Species of it (for the Sake of which we have mentioned the other) is removed by fuch Antidotes as overcome and destroy the Venomous Ferment, corrupting the Blood, and breaking its Compages. But to have hinted these things may abundantly fuffice for the present.

We must however take Notice, that those the main Alterations made by this Poison be in the Fluid of the Arteries, yet that That of the Nerves may hereby be considerably changed too; for This consisting, as well as the Blood of differing Parts, and being dispersed in small Tubes all over the Body, is not only very capable of various Degrees of Force; Impulse, &c. but Undulating continually towards the Brain, and being the chief Instrument of Motion and Action, may perhaps sometimes more immediately,

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convey the Mischief to the sensile Membranes, and thus be the Cause of those violent Pains, Convulsions, Sickness, with which Those who are Bitten are presently seized.

Many are the Experiments I could relate to evince the Truth of this Reasoning concerning the Viperine Venom, which do entirely agree with those made by Seignior Redi, whose Judgment and Sincerity in Observations of this Nature no Body ever called in Question, till Monsseur Charas having espous'd a Notion, that this Poison does not lie in the Yellow Liquor of the Gums, but in the entaged Spirits of the Viper, rais'd new Difficulties about the Success of some Trials made in France, endeavouring thereby to invalidate the Force and Authority of those made in Italy.

I shall therefore, in order to put this Matter out of all doubt, mention Two or Three Experiments made by Dr. Areskine, when at Paris, that it may appear how defective those of Mr. Charas are, and that the Difference of the Climate does not (as some began to imagine) (a) make any con-

⁽a) Vid. Redi Lettera fopsa alcune oppositioni, &c.

fiderable alteration in the Effects of this Ve-

nom, or its manner of Killing.

First then, having got a large Female Viper, he made it to bite fix Pigeons, one after another; the First and Second that were bit Died within about half an Hour, one a little Time before the other; the Third lived about Two Hours; the Fourth feemed to be very Sick, but recovered, the Fifth and Sixth were no more hurt than if they had been prick'd with a Pin or Needle.

Then he cut off the Head of a brisk Viper, and let it lie Twenty-four Hours, with the Fangs of which he wounded One Pigeon in the Breast, and another in the Thigh, which both expired, as soon after, as if they had been bitten by a living Viper. After this, having got a great many Vipers together, he made them bite upon a piece of Glass of a Cylindrical Figure, by this means preserving the Yellow Juice which they emitted, and slightly wounded Two Pigeons, he first let the Bleeding be stopt, then put some of this Liquor into the Wounds, upon which both the Pigeons died about Two Hours after.

about Two Hours after.

The same Ingenious Person tells me, that Monsieur du Verney made not only These, but also several other Experiments

of the same Nature, in the Royal Academy, with the like Success.

THESE Proofs are to convincing and full that no one, I think, can defire more; but they will receive yet a farther Confirmation from the Apparatus or Mechanism of the Organs, with admirable Nicety contrived for the discharge of this Venom, of which

more by and by.

Non is it any Objection against all This, that the Liquor is innecent and harmles in the mouth or Stomach of any one, to as that it may be fafely tafted or fucked out of the Wound and Iwallowed; for as we obferved before, that many Acid Substances taken into the Stomach, are by the Action of that Part turned to Alcalious, fo there is no Question but these Saline Spicula are partly by the Muscular Force of the Fibres. partly by the Salival Juice, all broken and diffolved; or if any can pass into the in-testines, the Balfam of the Bile will be an Antidote for Them; the Reafon of which will appear when we come to the Cure.

In the mean Time it may not be amile to remark; that even the Ancients feem to have known thus much concerning the Nature of this Poison; of this Galen gives us Testimony in several Places; particu-SHEET .

larly in his Book de Temperamentis (b), where he takes Notice, that nothing has the same Rower upon the human Body outwardly as inwardly; Thus (says he) neither the Venom of the Viper, nor of the Asp, nor frothy Spittle of the Mad Dog, are alike mischievous when they fall upon the Skin, or enter into the Stomach, as when outwardly communicated by a Wound.

The chief of the Latin (c) Physicians, Celsus has elegantly express'd the Matter in few Words, when advising to Suck the Wound made by the Bite; he adds, Neque Hercules Scientiam pracipuam babent biqui Pfilli nominantur, sed audaciam usu ipso confirmatam, nam Venenum Serpentis, ut quadam etiam Venatoria Venena, quibus Galli pracipue utuntur, non gustu sed in Vulnere nocent.

AND therefore brave Cato when marching the Remains of Pompey's Army thro' Africa, very wifely told the Soldiers almost Choak'd with Thirst, yet afraid to drink of a Spring they came to, because full of Serpents (d).

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have known thus much concers of did (4)

⁽e) Medecini L. s.a. ay. anothol aid to stur

⁽d) Lucan, Pharfal I graval ni vnomiffel au

Noxia Serpentum est admisto Sanguine Pestis, Morfu Virus babent & Fatum Dente minantur Pocula Morte carent - Books tone and Aster

In the like manner it was in those times also known, that the Virulent Juice had the same bad Effects, when mix'd with the Blood, by means of a common Wound, as when communicated by the Venomous Bite. This made Celfus (e) advise in sucking out the Poison, to take care there be no Ulcer in the Mouth; tho' this Caution be rather flighted and ridiculed by Severinus (f) and others; who do hereby discover how little they understood of the Seat and Nature of this Poison. And Galen (g) mentioning the Story of Cleopatra, relates from other Authors, that she killed herself by pouring the Virus of an Asp into a Wound made in ber Arm by ber own Teetber leuforthe view il embire

4) Ulefulnois of Experimental Indofer by Part 2. P. 50.

William Mirabilibus

⁽e) Loc. ante citat.

⁽f) Vipera Pythia, p. 361. And a straight (g) De Theriac, ad Pison. lib. 1. c. 8. Vid. etiam. c. 10.

In short, it is upon this Foundation, that Pliny (b) affures us, the Scythians Poison'd their Arrows with the Sanies of Vipers mix'd with human Blood; the way of doing it Aristotle (i) has as large related; and the Tartars are said to use the like Trick to this Day. After the same manner the Indians make Use of the Venom of the Lizzard, called Gecco; this Creature they hang up by the Tail, and by Whipping exasperate till it discharge its Virus, in which they Tinge their Darts; and a very sight Wound with these Weapons is speedy Death (k).

It is worth the while in the next Place to confider the Cure of this Mischief, which without all doubt ought to be by such External Management of the Wound as may immediately destroy the insuled Venom.

MR. Boyle (1) experienced a hot Iron held as near the Place as the Patient could possible endure it very effectual to this Purpose. But the

⁽b) Nat. Hift. lib. pr. c. 53. Scythas Sagittas tingunt Viperina Sanie & humano Sanguine; irremediabile id Scelus.

⁽i) De Mirabilibus.

⁽k) Bontii Hiftor. Ind. lib. 5: c. 5.

⁽¹⁾ Usefulness of Experimental Philosophy, Part z. P. 50.

same Method did not answer Expectation in the Famous Cafe related by Monfieur Gharas (m) them stollal enclosed Temol

An extraordinary Virtue against this and other venomous Bites is afcribed to the Snake-Stones brought from the East-Indies, one of which is to be presently apply'd to the Part, and let flick till drop off; thefe are faid to be taken out of the Head of the Serpent called by the Portugueze, Cobra de Capelo; and to fuck the Poison out of the Wound. Seignior Redi (n) made Trials with feveral of them, but found no Service from any, Yet Baglivi (6) tells us of a terrible Bite of a Scorpion cured this way. Monfieur Charas (p) his Pigeons all died, tho' thefe were immediately clapped on, and fluck close to the Wound: but Dr. Havers faw a good Effect of one upon a Dog, who tho' feverely bitten, fuffered no Harm, nor any farther Mark of Poison than a livid Circle round the Place, nospil a thiw harst in

In plain Truth, as these celebrated Stones do not feem to be what it is pretended they and thus laved the Life for about four Hours.

Hour) yet after this the Mortifice 30 .m . 9 (m)

⁽n)Esperienze intorno a diverse Cose Naturali.

⁽⁰⁾ Difert. de Tarantula Histor. 5.

⁽p) Pag. 88.

are, but rather Factitious Bodies compounded, it may be, of Calcined Bones, and fome Testacious Matters mixt together; so by Reason of their spongy and porous Texture, they do very readily adhere to any moistned Part of the Flesh, and imbibe whatsoever Humidity they meet with. This their Quality any one may Experience by holding one of them to the Roof of his Mouth; and it is upon this Score, that when put into Water, Bubbles are raised by the Air in their Interstices, which some have too fondly thought to be the Effects of their throwing out the Venom they had sucked in.

THEIR make being thus, some Part at least of the Poisonous Juice may easily be drawn out of the Wound by such an Application, and yet so much of it may sometimes happen to remain in the Flesh as may make the Bite however to prove Mortal And thus it fared with a Pigeon, to the Thigh of which first Bitten by a Viper, I applied one of the Stones; for the it stuck so fast to the Wound, and thus saved the Life for about four Hours, (whereas others usually died in about half an Hour) yet after this the Mortification of the Part prevailed to that Degree as to become fatal to the tender Creature.

But our Viper-Catchers have a Remedy far beyond all these, in which they do place so great Considence, as to be no more assaid of a Bite than of a common Puncture, immediately curing themselves by the Application of their Specifick.

This tho' they keep as a great Secret I have however upon strict Enquiry found out to be no other than the Axungia Viperina presently rubbed into the Wound! And to convince myself of its good Effects I enraged a Viper to Bite a young Dog in the Nose; both the Teeth were struck deep in; he howled bitterly, and the Part began to swell; I diligently applied some of the Axungia I had ready at Hand, and he was very well the next Day.

Bur because some Gentlemen who saw this Experiment were apt to impute the Cure rather to the Dog's Spittle, (he licking the Wound) than to the Virtue of the Fat, we made him to be bit again in the Tongue, forbearing the Use of our Remedy, and he died within Four or Five Hours.

AT another time I made the like Trial, with the same Success.

As this Axungia confifts of Clammy and Viscid Parts, which are withal more Pennetrating and Active than most other Oily Substances.

Substances, so these, without all Doubt do Involve, and as it were Sheath the Volatile Salts of the Venomous Liquor, and thus prevent their Shooting out into those Crystalline Spicula, which we have observed to be the main Instruments of that deadly Mischief which attends the Bite.

By this means it comes to pass, that this Cure, if rightly managed, is so easy and certain, as not to need the Help of any Internal Medicines to sorward it; but these however must take Place, where, thro' want of the other, the Poisson is spread farther, and has tainted the whole Mass of Blood.

Nor yet is it necessary even in this Case to Fatigue the Patient with a Furrage of Theriacas, Antidotes, &c. for the Volatile Salt of Vipers is alone sufficient to do the Work, if given in just Quantities, and duly repeated; provided moderate Sweats be incouraged in Bed; thus it succeeded with Monsieur Charas in the before-cited Case and in some others I could relate, in one of which the Mischief had gone so far as to induce an universal laterus.

This leads me last of all to hint something concerning the Use of the Viper in Physick; because Authors are very large in enumera-

ting its Virtues against many, and those to some of them very obstinate Distempers.

ONE of the first whom we find in Antiquity to have made Use of the Flesh of this Creature to Medicinal Purpofes, was, Ithink, Antonius Musa; the Famous Physician to Offavius Cafar; of whom Pliny (q) tells us, That when he met with incurable Ulcers, be ordered the eating of Vipers, and by this Means they were quite Healed. So has hard and

Ir is not improbable that he might learned this from the great Greek Physician Craterus, mentioned often by Cicero in his Epiftles to Atticus, who as (r) Porphyrius relates, very bappily cured a miserable Slave, whose Skin in a strange Manner fell off from bis Bones, by advising bim to feed upon Vipers dressed after the Manner of Fish.

Be this as it will, in Galen's Time the profitable Qualities of the Viper were very commonly known; himfelf relating very (1) Remarkable Stories of the Cures of the Elephantiasis, or Lepra, done by the Viper Wine.

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⁽⁹⁾ Lib. 30. c. 13.

Ad amount and (1) (1) De Abstinent, ab. Animal. lib. 1. p. m. 16.

⁽¹⁾ De fimpl, Medic. Facult. lib. 11, c. 1.

ARETAUS, who must probably liv'd about the same time with Galen, and of all the Antients has most accurately described the Eliphantialis, commends as Graterus did the Eating of Vipers instead of Fish in the same Diseases (t). And to this Purpose I remember, that as Lopes (u) in his Relations of the Kingdom of Congo in Africa, takes Notice how greedily the Negroes eat Adders, roafting them, and esteeming them as the most delicious Food; fo Dampier (x) also informs us, that the Natives of Tonquin in the East-Indies do treat their Friends with Arrack, in which Snakes and Scorpions have been infused, accounting this not only a great Cordial, but also an Antidote against the Leprosy, and all other Sorts of Poison.

THE Physicians in Italy and France do very commonly Prescribe the Broth and Jelly of Vipers Flesh for much the same Uses, that is, to invigorate and purify the Mass of Blood, exhausted with Diseases, or tainted with some Vicious and Obstinate Ferment.

⁽t) Curat, Diuturn. lib. 2. c. 13.

⁽u) Vid. Purchas. Pilgrims, Part 2. 1. 7. 6. 9.

⁽x) Voyages, Vol. 2. Part 1. p. 53.

FROM all this it appears, that the main Efficacy of the Viperine Flesh is to quicken the Circle of the Blood, promote its due Mixture, and by this means cleanse and scour the Glands of those Stagnating Juices, which, turning to Acidity, are the Origine of many, at least, of those troublesome Distempers in the Surface of the Body, which go under the Names of Scropbulus,

Leprous, &c.

THESE good Effects are owing to that penetrating, strong Salt, with which the Substance of these Creatures does in a very great Proportion abound, and the Reason of this is from the Food, they live on, which we have observ'd before to be Lizzards, Moles, &c. whose Nature every one knows to be such as must necessarily, when they are dissolved in the Stomach, supply the Blood with a great Quantity of Active and Volatile Parts: And herein lies the difference between the Flesh of Vipers and that of other Innocent Serpents, which feeding upon Grass, Herbs, &c, do not recommend themselves to us by any of those Properties which are in fo Eminent a Degree found in the former.

WHOSOEVER Reflects on what has been faid on this Head, will very readily Acknow-

ledge that our Phyficians deal too Cautioufly or Sparingly with a Remedy which may be applied to very good Purposes, when they Prescribe a few Grains of the Powder of dried Vipers, or make up a small Quantity of their Flesh into Troches; whereas if Service be really to be done this way, the Patient ought to eat frequently of Viper Gelly, or Broth, or rather as the ancient manner was to boil Vipers, and eat them like Fish, if this Food will not go down, (tho' really very Good and Delicious Fare) to make use at least of Wine, in which Vipers have for a long Time been infused, by which I know a very obstinate Lepra has been removed; or lastly, in some Cases, especially where Wine is not convenient, to take good Quantities of their Volatile Salt, in which alone the Virtue of the before named Medicines does principally refide.

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APPENDIX

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Containing some Anatomical Observations on the Viper, and an Account of some other Venomous Animals.

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In repeated Diffections of the Viper, comparing the Descriptions given Us by Authors with the Parts themselves, I have a found them in many Particulars to be very Desective. I shall however at present confine my self to some Observations made chiefly on those Organs which serve to Present and Emit the Poison.

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To begin therefore with the Head. The Skull (Fig. 2.) is composed of several Bones, joined together by Sutures, as in Man, but with this Difference, that the Os Frontis, in the Viper consists of two Bones united by a Rectilinear Suture, and the Parietal Bones are Entire; whereas in Man the Parietal Bones have Sutures, and the Os Frontis is Entire.

(a) Shows two small Semicircular Bones which form the inferior Part of the Nostrils.

(b) The two Bones which make the upper part of the Nose, from the latter pass down two thin Lamina, which touching one another, and falling perpendicular upon the Ossa Palati, composed the Septum of the Nose.

(cc) POINT out the Offa Frontis, which form the upper Part of the Orbits of the Eyes. And (cc) the Orbits themselves.

The Parietal Bones (d) make a large Cavity, in which the greatest Part of the Brain is contained, and This we may call the Sinciput.

BEHIND this Bone are placed the Offa Temporum (ff), in which lie the Organs of Hearing; and behind them a Bone (g) which we may call the Os Occipitis, covers the posterior part of the Brain. This is joined to the first Vertebræ of the Neck (b) by a Spherical Articulation, as all the Vertebræ are to one another, and this is the Reason why this Creature can turn its Head and Body so much, and so nimbly, every way.

To some of These there are two other. Bones Articulated for Particular Uses.

THE First of Them, which serves as a Basis to the Articulation of the Rest (a Fig. 4.), is fastned by one Extremity to a small Protuberance (i Fig. 2.) in the middle and laternal Part of the Os Sincipitis, and running back towards the Vertebra, lies in the same Plain with the Sinciput. This Bone has a Motion, the very inconsiderable, both upwards and downwards. By means of this, the opening of the Mouth is somewhat inlarged in the time of Deglution.

THAT end of this Bone, which is next to the Vertebra, is Articulated at Oblique Angles with Another (b), placed Horizontally, and whose Motion is forwards and backwards, being made chiefly for moving the Bones of the upper and lower Jaw, into which the Teeth are inserted By reason of this kind of Articulation, it cannot contribute any thing towards Widening the Mouth for Swallowing.

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Texts Bone, and that with which it is

joined, I call the Common Bones.

The Upper Faw (Fig. 3,) is, besides the Teeth, composed on each side of three Bones. The First (a) into which the Poisonous Fangs are fixt, is articulated with the Anterior Protuberance of the Orbit of the Eye; and has a Motion of Flexion and Extention, that is, forwards and backwards, by which the Fangs are Erected or Depreis'd. It is small at the Joint, but grows broader by Degrees, to a pretty large Basis, the better to contain a considerable Number of Teeth. It is Spongy like the Substance of the Vertebra, and no ways sit to be the immediate Organ of Hearing, as Mr. Charas and some others have imagined.

Articulated by one extreme to the Former, (f) and by the other firmly fixt to the Middle of the Third Bone. when This is thrust forwards, it likewise pushes the First, and by this means the Erection of the Fangs is helped; and when it is pull'd backwards, they are Depressed.

Extremity (e), to the end of one of the Bones of the Lower Jaw (e Fig. 4.) and being somewhat crooked, turns in a little towards.

THIS

the Basis of the Cranium, and running along the Inferior Part of It towards the Nose, terminates near the Internal and Anterior Part of the First Bone.

THE Lower Jaw (cdefg Fig. 4.) on each fide is made up of two Bones, but firmly united, the extremity of the one entring within the other (f). The First (cde) articulates with the Second of the Common Bones (b), where it is broad, and fends off an Apophysis into which there is a Muscle inserted, which helps to open the Jaw. There is in This a Hole (d), for the Entrance of the Branch of the Nerve, which passing thro' a Canal in the middle of It, goes to the Extremity of the Second Bone, and in its way fends off feveral Branches which go to the Teeth, and also a very considerable one, which goes out at (e), and is wholly fpent upon the Neighbouring Mufcles.

THE Second Bone (fg), serves chiefly to receive the small Teeth, which answer to

Those in the Upper Jaw.

As for the Teeth, they are of two Sorts, the Great or Poisonous Fangs, and the Small.

THE Great (b Fig. 3.) being fixt in the First Bone of the Upper Jaw, are crooked and bent, like the Dentes Canini in most D 4 Carnivo-

Carnivorous Animals. They are manifestly hollow from their Root a considerable way, not to the very Apex or Point, (which is solid and sharp, the better to pierce the Skin) but to a small distance from it, as is plainly seen by splitting the Tooth thro' the middle (Vid. Fig. 6.): This Cavity ends at the Convex Part in a visible Slit, very well resembling the Nip or Cut of a Pen (Fig. 9. d.) which is the Emissary or Outlet to the Poison.

GALEN (a) has given Us a considerable Hint of this Make of the Tooth: For, The Mountebanks (He says) used to suffer themselves to be Bit by Vipers, baving sirst with some Passe stops the Holes of their Teeth, that the Venom being thus kept in, the Spessators might think They did by their Antidotes secure themselves from its dangerous Esses.

THE Reason why these Teeth are Grooked is, That the Paint of the Tooth, when the Vipers Bites, may be Perpendicular to the Part to be wounded; for the Head being raised back in the time of Biting, and the Tooth erected, if This were strait It would not, by reason of its oblique Situation to the

⁽a) De Theriac. ad Pifon. Cap. 12.

Part enter with so much force, nor so deep

As for the Number of the Poisonous Fangs, I have observed that there are, for the most part, besides One, Two or Three on each Side, fixt Perpendicularly to the sirst Bone of the Upper Jaw, some others which are Young, and of a smaller Size, adhering to the same Bone: Their Points are hardened, and they have their Fissures formed as in the other, but their Roots are Soft and Mucilaginous, like the Roots of the Teeth in Infants, and so they lie always depress'd at the Bottoms of the Former, as may be seen Fig. 10. c.

They drop off from the Bone at the least Touch; and therefore some Anatomists have imagined them to be fastened to Muscles or Tendons, which would have rendred Them altogether Useless: For they are made to supply the place of the Greater, when they fall away, or are pull'd out by Accident; and in order to this, they do by Degrees harden, and rise more and more till at last they stand upright, and come to a Perpendicular Situation in the Bone.

THEY are not all of the same Growth, for in some we can only discern the Shape of a Tooth without any hardness, in others

the Point, and in the next somewhat more is hardened, and fo on to the greatest Fang.

THEIR Number is very uncertain, there being fometimes Six or Seven in each fide, of the Jaw, Sometimes fewer.

THESE feem to have occasioned the Difputes among the Ancients concerning the

Number of the Viperine Teeth.

THE Poisonous Fangs have small Holes at the Internal Part of their Root, thro' which the Vessels pass which carry their Nourishment (Fig. 5. a.)

IT is remarkable, that Nature has provided Young Vipers with Poisonous Teeth grown to their Perfection, that so they may Kill their Prey as foon as they come into the World.

THE Second kind of Teeth, or the Small, are booked, and bent as well as the former. but without any Slit or Opening. Of These there are Four Rows, two on each fide of They are fixt in the Third the Mouth. Bone of the Upper-law, and in the Second in the Lower, as exhibited to view in the Figure.

THEIR U/e is to hold the Prey fast while Execution is done by the Bite, leaft in struggling to get away it should pull out

the Fangs.

THE Instruments that Emit the Venom being thus described, we come next to Thole which serve to Prepare and Contain It.

This Liquor is separated from the Blood by a Gland on each side of the Head. placed in the Anterior and Lateral Part of the Os Sincipius, just behind the Orbit of the Eye (Fig. 9. a.). It lies immediately under that Muscle which helps to depress the Fangs, so that by the Action of This it is Press'd; which is an admirable Contrivance to forward the Secretion of the Juice out of It.

Trs a Conglomerated Gland, composed of many smaller ones contained in a common Membrane; each of These sends off an Excretory Vessel, all which do afterwards Unite and Form one Dust (b), which running towards the Roots of the Fangs, discharges the Yellowish Liquor into a Bag.

This Bag is fixt to the Basis of the First Bone of the upper Jaw, and also to the extremity of the Second, covering the Fangamear the Root (d. Fig. 10). To the upper Part of this Vesicula there is joined another (a), in the Anterior Part of which there is a Rassage for the Poisonous Teeth.

Thus consists of Muscular Fibres, both Longitudinal and Circular, by Means of which it can contract it self when the Fangs are erected; and by this Contraction the Venom is press'd into the Hole at the Root of the Tooth, and forced out at the Fissure near the Point.

THAT this is so done, I have frequently observed with the naked Eye, having cut off the Head of a Viper, and immediately pinched the Neck to make it open the Mouth wide; for by this means the Venom

was Squirted out as from a Syringe.

WHEN the Viper lies quiet with its Mouth shut, the Fangs are depress'd and covered with the External Bags; when It intends to Bite; it opens the Mouth very wide, at the same time the Lower Extremity of the Second of the Common Bones (Fig. 4. b) is moved forwards by Proper Muscles, and turns as it were upon a fixt Centre (b), thus pushing forwards the Upper and Lower Jaws, whose Extremes are united at (c). By this means the Lower Part of the First Bone of the Upper Jaw (Fig. 3. a) is thrust forwards, the other Extremity turning in the Cavity of its Articulation, where it is fastened by Ligaments; the Fangs being by this Mechanism Erected, the Bags which cover'd

them by their Contraction of their Longitudinal Fibres, are pulled back, and the Action of the Circular Ones does at the same time straiten the Internal Bag, and sorce the Juice into the Teeth.

BESIDES this, when the Viper bites, It strikes in the Fangs to the very Root; and thus the Vesicula are still more squeezed for

the discharge of the Liquor.

It is worthy our Observation, that the Viper can move the Jaw Bones on one fide without moving I hose on the other, for they are not joined together at the Extremes as in other Animals ; which Contrivance is very Beneficial to It in the swallowing Its Prey, in that while the Teeth on one fide fland unmoved, and fixt in the Flesh to hold It, Those on the other fide are brought forward, to draw it in farther, then they keep It fast till the former Jaws advance again in their Turn. Thus they act successively, and force the Animal intire (there being no Dentes Incifivi or Molares to divide It) into the OE sophagus, whose Muscular Fibres are very Weak, and can help but little in the Business

It may not be amiss to conclude these Remarks with a short Hint concerning the Organs of Hearing; Mr. Charas (who is however followed by others in It) having, as

Palitical

we mentioned before, Entertain'd a very

absurd Opinion about Them.

THESE then are Placed in the Temporal Bones, as in other Animals, and confift of One Long, Small Bone (Vid. Fig. 11.) like That of Birds, whose Extremity is broad, like the Basis of the Stapes in Man. and fituated upon a little Hole, which opens into the Labyrinth; and besides of Three Demicircular Canals (Fig. 12. a 6) which allo open into the Labyrinth.

THIS Labyrinth (Fig. 13.) has a great many Eminencies in It of no determin'd Regular Figure (Fig. 14.) and is covered with a Membrane full of Nerves and Blood Vellels. The Nerve enters from the Brain at a hole in the Middle of this Cavity (a Fig. 15.)

THERE is no Cochlea in the Ear of the Viper; but the Anterior Demicircular Canal opens into a Semicanul, which makes fome Spiral Turns in the Fore-part of the Laby-

rinth, in like manner as it is in Fifb.

THE Passage for the Air to these Organs is not Outward, but, as in some Fish, thro' the Mouth, between the Upper and Under Taws, running below the Second of the Common Bones. But of This, and also of the true Mechanic Use of the aforesaid Paris, more hereafter.

Poisonous Animals.

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As the Viper is Hurtful by Instilling a Liquid Poison into the Wound made by Its Teeth, so likewise are All Venomous Creatures whatsoever, whether They Bite or Sing, tho' there be some Difference in the Contrivance of their Organs, Mischievous after much the same Manner, and mostly for the same good Use and Purpose, that is, in order to Kill their Prey.

This will fully appear by Examining the Infiruments of Death in feveral of them

First then, the Spider, which lives upon Flies, Wasps and the like Infects, is provided with a hooked Forceps, placed just by the Mouth, very sharp and fine, with This He pierces the Flesh of little Creatures caught in his Webb, and at the same time Insuses a Juice into the Puncture, by which means the Animal being Killed, He Sucks out the Moisture from the

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the Body, and leaves it a dry husky

MR. Van Leewenboeck in his Account of Spiders lately published (a) has together with the other Parts, by the Help of his Glasses, described these Weapons, which he finds to lie couched on each side the Mouth in a Row of Teeth, till they are raised to do Execution. These Rows of small Teeth are designed to hold the Prey, that it may not escape the Force of the Bite. And in the Convex Part, towards the Point of each Claw, he has delineated a little Aperture of Shi, thro which he supposes the Poisson Issues out at the same Time the Wound is made.

This Situation and Motion of these Parts I have several Times view'd, but was never able to discern the Exit or Opening; which having a just Difference to the Industry and Application of so nice an Observer in Things of this Nature, I at first imputed to my own Unskilfulness in such Enquiries, knowing my Microscope to be very good; till at last, after repeated Trials, I very plainly saw that nothing Dropt out at the

⁽a) Philosoph. Transact. No. 271.

Claws, which were always Dry while the Spider Bit, but that a short, white Probability was at the same Time thrust out of the Mouth, which instilled a Liquor into the Wound.

THEN I concluded that Mr. Leewenbook had Delineated the Apertures in these Weapons, only from the Analogy which he thought They must bear to the Viperine Fangs, the Sting of the Scorpion, Bee, &c. And I was confirmed in this Opinion by examining a Claw of the great American Spider, described (tho but lamely) by Piso (b), and called Nhamdu; this was given me by Mr Pettiver, and being above Fifty times bigger than That of the largest European Spider (c), if there had been any slit in it, my Glass would no doubt have discovered it, but yet I found it to be quite Solid.

AND indeed the Quantity of Liquer emited by our common Spiders when they kill their Prey, is visibly so great, and the wounding Weapon, so Minute, that they could not contain but a very inconsiderable Portion thereof, if it were to be discharged that way,

⁽b) Nat. Hift. lib. 5. cap. 10. 1

⁽c) Vid. Fig. 18.

To this purpose I remember Mr. Boyle fornewhere tells a Story of a Person Blinded by a Spider droping its Venom into his Eye, which tho' it can hardly find credit with fome, is however confirmed by what Pifo relates of his Nhamdu, viz. That in catching it great heed is to be taken leaft its Poison fall into the Eye, this causing a total Loss of the Sight. and of mad ihim vad &

WHAT Mr. Leevenbook observes of the Enmity these Creatures bear to one another I have often feen; for if Four, Five, or more be put together into a Glass, they immediately fall to Fighting with all the Fury maginable; Limbs struck off are usually the Preludes to the terrible Slaughter, which continues till all are killed, the Surviving Conqueror himself most commonly Dying of his Wounds. to be onite Solid.

THE Weapons of Mischief in the Scolopendra are much the same with those of the Spider, only larger. One of these Creatures I had brought to me alive out of a Ship which came from the East-Indies, where Bentius (d) fays, Their Bite is so painful that it makes People almost mad; but it

⁽d) Hift. Ind. p. m. 560 H 1810 (4)

died before I had an Opportunity of making Trial of its Poison; however, I very diligently looked upon the Claws (e), and found Them to have no more Cavity than is necessary for the Insertion of their Muscles, nor any Exit or out-let towards their Apex; these therefore serve only to pierce the Flesh, and the Venom is insused from a Proboscis out of the Mouth; tho' This I could not very well discern, because the Parts had been kept too long dry before I examined Them.

The Case is much the same with Stinging Animals; of These The Scorpion is the Chief, whose Virus in different Countries is inore or less dangerous according as 'tis exalted by various Degrees of Heat; thus in Africa particularly its Effects are so dreadful, that as Joann. Leo (f) tells us, The Town of Pescara there is in a manner lest desolate by the Inhabitants in the Summer Time, by Reason of the great Abundance of these Creatures, certain Death following their Sting.

SOME of this deadly Kind (The same, tho' not so large with That in the East-Indies, of which Swammerdam (g) has given a very

⁽c) Vid. Fig. 17.

⁽f) Hiftor. Afric. lib. 6.

⁽g) Hift. Infect. p. 147.

accurate Description and Figure) Seignior Redi had sent him from Tunis (b); and it being November, irritated them to Sting Pigeons, Pullets, &c. without any bad Effect at all of their Poison; but upon the approaching Spring One of Them which had been kept all the Winter, nay, Eight Months without any Food, and the Wound of whose Sting before was harmless, Stung to Death Two Pigeons successively; but a Third and Fourth wounded in like Manner, suffered no hurt. Yet having let the Scorpion rest all Night, He killed another Pigeon the next Morning.

At the Point of the Sting he very often could discern a small Drop of white Liquor, which when the Wound was made, entered

into the Flesh?

As This Liquid Venom is either not separated from the Blood into the Cavity of the Sting, during the Cold of Winter, or at least the Scorpion wants Strength at that time to throw it out with Force and Energy; so even in the hot Months, after it is exhausted by Two or Three Anacks, the Sting is no longer hurtful, till the Expence of this Juice, is recruited by Time.

⁽b) Generazione degli Infetti. p. 51.

Tis very Remarkable concerning this Insect, what an ingenious Gentleman who lived several Years in Barbary told me he had many times tried; that if it be furrounded with a Circle of Burning Coals, it does upon the Sense of the Heat, turn it felf violently every way to make an Escape; but finding it impossible, and the Pain from the Fire increasing, it strikes it self twice or thrice with the Sting on the Back, and immediately Dies of the Wounds.

OTHERS may make what Reflections they please on this Self Murder. it is to me beyond all Disputes sufficient to decide the Controversy between Writers, whether Poisonous Animals of the same Species can kill each other. Which is not only confirmed by what we before observed of the Spider, but is likewise true of Vipers; for Dr. Hermen bringing from the Indies three of the Cobras de Capelo all in one Glass, two of them were killed in the Voyage by Fighting.

As the Viperine Venom is the Quintessence and most active Part of those Animal Juices with which the Viper is nourished, so is also that of the Scorpion; for this Insect lives chiefly upon Locusts, &c. And the fame Person from Barbary inform'd me,

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That feeing oftentimes Locusts sticking up in the Ground as if they were Set there, by looking he found that some Part of them was always eat away, and that these Places were the Holes of Scorpions who had dragg'd their Prey thither, and sed on it as they had Occasion.

In like Manner, as the Axungia Viperina Cures the Bite of the Viper, so also the Oleum Scorpionum, or Oil in which Scorpions have been insused, is a present Remedy for the Sting of this Creature.

THE Mechanism of the Sting of a Bee Dr. Hooke has very accurately (i) described. One may with the naked Eye sometimes see it discharge the Venom; and in This, by the help of a Glass, I can easily discover a great Number of Minute Salts Floating.

AND indeed this Apparatus or Contrivance is so Universal, that we find even in Vegetables something Analogous hereunto; for the last mentioned Author (k) has shewn us, That the pricking Points of Nettles do at the same Time they peirce the Skin, instil a venomous Juice into the Wound.

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⁽i) Micrograph. Observ. 34. 101 noles I omst

⁽k) Ibid. Obs. 25.

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Claws; thefe are folid, and very, tharp, in that they can early pierce the Skin; and be

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Join these Two Poisons together, because tho' they differ very much in their Effects, yet both do agree in this, that they induce a particular Delirium fui generis, attended partly with Maniacal, partly with Melancholy Symptoms.

THE Tarantula of which the Figure may be feen in Baglivi's Differtation (a), is a Spi-

(a) De Tarantul.

der

der of Apula of the Octonocular Kind; that is of that Species that has eight Eyes and fpins Webbs; it has eight Legs, four on each Side, and in each Leg three Joints; from the Mouth proceed two Darts, in Shape just like to a hooked Forceps or Crab's Claws; these are solid, and very sharp, so that they can easily pierce the Skin; and between those and the Fore-Legs there are two little Horns, which I suppose do answer to those Bodies, called from their Use in Flies, the Feelers; because as they do, so this Creature is observed to move em very briskly when it approaches to its Prey.

This, as other Spiders do, propogates its Species by laying of Eggs, which are very numerous; so that there are found sometimes in the Female, when diffected, a hundred or more; and these are hatched partly by the Heat of the Mother, and partly by that of the Sun, in about twenty or thirty

Days Time.

THERE is also a Spider of the like Nature with the Tarantula in the West-Indies, which Fr. Hernandez (b) describes by the Name of Hoitztocatl, or the Pricking Spider; and says, that its Bite induces Madness.

⁽⁸⁾ Histors Animal. Nov. Hispan. Traff. 4. c. 5.

In the Summer Months, especially when the Heats are greatest, as in the Dog-Days. the Tarantula creeping among the Corn in the Fields, bites the Mowers and Passengers; in the Winter it lurks in Holes, and scarcely is feen , and if it does bite then, it is not Venomous, neither does it induce any ill

Symptoms, Bur in the Hot Weather, altho' the Pain of its Bite is at first no greater than what is caused by the Sting of a Bee, yet the Part quickly after it is discoloured with a Livid, Black, or Yellowish Circle, and raised to an inflam'd Swelling; the Patient within a few Hours seized with a violent Sickness, Difficulty of Breathing, universal Faintness, and fometimes Trembling, with a Weakness of the Head, being asked what the Ail is makes no Reply, or with a Querulous Voice, and Melancholy Look, points to his Breaft, as if the Heart was nortake Care to prevent this botts flow

During this mournful Scene all the usual Alexipharmick and Cordial Medicines are of no Service; for notwithstanding their repeated Use, the Patient growing by Degrees more Melancholy, Stupid, and strangely Timorous, in a fhort Time expires, unless Musick be called to his Affistance, which

alone, without the help of a Medicine, performs the Care.

Instrument, althor the Sick lie, as it were, in an Apoplectic Fit, they begin by Degrees to move their Hands and Feet, till at last they get up, and fall to Dancing with wonderful Vigour, at first for Three or Four Hours, then they are put to Bed, refreshed from their Sweating for a short time, and repeat the Exercise with the same Vehemence, perceiving no Weariness or Weakness from it, but professing they grow stronger and nimbler the more they Dance.

Ar this Sport they usually spend Twelve Hours a Day, and it continues Three or Four Days; by which time they are generally freed from all their Symptoms, which do nevertheless Attack'em again about the same time the next Year; and if they do not take Care to prevent this Relapse by Musick, they fall into a Jaundice, want of Appetite, universal Weakness, and such like Diseases; which are every Year increased, if Dancing be neglected, till at last they prove incurable.

As Musick is the Common Cure, so they who are bitten are pleas'd some with one fort

fort of it, some with another; one is raised with a Pipe, another with a Tymbrel; one with a Harp, another with a Fiddle; so that the Musicians make sometimes several Eslays before they can accommodate their Art to the Venom; but this is constant and certain, notwithstanding this Variety, that they all require the quickest and briskest Tunes, and are never moved by a slow, dull Harmony.

While the Tarantati, or Affected, are Dancing, they lose in a manner the Use of all their Senses, like so many Drunkards, do many Ridiculous and Foolish Tricks, Talk and Act Obscenely and Rudely, take great Pleasure, in Playing with Vine-Leaves, with Naked Swords, Red Cloths, and the like; and on the other Hand can't bear the sight of any thing Black; so that if any By-stander happen to appear in that Colour, he must immediately withdraw, otherwise they relapse into their Symptoms with as much Violence as ever.

It may afford some light towards Understanding the Nature of this Poison, to observe that Apulia is the hottest part of all Italy, lying Eastward, and having all the Summer long but very little Rain to temper the Heats, so that the Inhabitants, as one

of that Country observes (c), do Breathe an Air, as it were, out of a Fiery Furnace; hence their Temperament is dry, and a dust. as appears by their being generally Lean, Passionate, Impatient, ready to Action. Quick-witted, very subject to Inflamatory Diftempers, Phrenfies, Melancholy, and the like, upon which account there are more Mad People, in this, then in all the other Parts of Italy; nay, what in other Countries is but a light Melancholy, arifes here to a great height; for Women in a Chlorofis do fuffer almost the same Symptoms as Perfons Poisoned by the Tarantula do, and are Cured the same way; and in like manner the Venom of the Scorpion, does here, in Effects and Cure, agree very much with that of this Spider.

FROM all this History it sufficiently appears, that those who are bitten by a Tarantula, do thereupon become Delirious and that in order to account for their surprizing Symptoms, the Nature of a Delirium, from which many of them proceed, ought

to be understood.

Such is the Constitution of the Humane OEconomy, that as upon the Impression of

⁽c) Baglivi, p. 11.

outward Objects made upon the Organs, and by the Fluid of the Nerves conveyed to the Common Senfory, different Species are excited there, and represented to the Mind, so likewise upon this Representation, at the Command and Pleasure of the Soul, part of the same Fluid is determin'd into the Muscles, and mixing with the Arterial Blood there, performs all the Variety of voluntary Motions and Actions.

This Order has been always so constant in Us, that at Length by a Kind of natural Habitude, without the Intervention of the reasoning Faculty, Representations made to the Mind do immediately and necessarily produce suitable Motions in the Bodily Organs. When therefore these Representations are irregular, the Actions consequently, to them must necessarily be so too.

This being premised, it may perhaps, be probably said, that a Delirium is the Representation and Various Composition of several Species to the Mind, without any Order or Coherence; together, at least most commonly, with irregular, or, as it were, undesigned Motion of the Body; that is such a wandering and irregular Motion of the Nervous Fluid, whereby several

feveral Objects are represented to the Mind, and upon this Representation divers Operations performed by the Body, tho' those Objects are not Impressed upon the Organs, nor those Operations or Motions deliberate-

ly Commanded by the Soul.

THE Mind indeed is the first Principle of all Muscular Motions; but in such Cases as these, its Promptitude to Action or Habit being so great, it is in a manner furpris'd, and cannot recover itself after the Spirits are with violent force determined pursuant to the Representations of the Species. For as in the former State of Things a Man is faid to Act Rationally, fo this latter Case is call'd the Perturbation of Mind, that is, a Delirium; tho' it is very manifest, that in reality the Defect is not in the Rational, but Gorporeal Part; fuch Species being really presented to the Mind, upon which, by the Order of our Conftitution, fuch Motions ought to follow in the Body:

Thus, for Instance, if the Liquor of the Nerves is, without the Presence of any thing hurtful, put into a Motion like unto that which a painful Impression makes in it, the same Bodily Actions must insue as proceed from Fear, Anger, or the like Passion,

Passion, determining the Spirits towards the Muscular Parts; and a By-Stander, who fees no reason for such a Representation made to the Mind, will presently conclude that the Person thus acting acts without or beside his Reason, that is, is Delirous; especially if the Hurry and Confusion of the Spirits be such, that not only one, but several different Species be at the same time presented to the Mind; for a Man in this Case may act the Part of one joyful, Angry, Timorous, or the like, without any appearing Reason, and all this almost in the same Moment of Time.

In one Word, Deliria are the Dreams of those who are Awake; and as these in Us Sleeping are infinitely various and wonderfully Compounded, and all from the same common Cause, diversely pressing the Orifices of the Nerves, and thus making different Repercussions of their Fluid; and as we all know that this Confusion making the Representation of several Species to the Mind, there do hereupon follow, the' the Body seem now at Rest and in perfect Repose, such Motions in the Organs as are usually the Effect of the Arbitrary Determination of the Spirits thither, lo we are now to enquire what Alteration of the Body made vois) Micrograph. Curiof. g. 69.

Norther.

by this Venom, can be the Occasion of this Disorder and Tumult in the Nervous Fluid, which excites in the Party infected such Surprizing, and almost Contradictory Representations.

Most of the Symptoms of those who are bitten by the Tarantula are at the First, that is before they rise to a Delirium plainly the same with those which the Bite of a Viper induces; without doubt therefore, as we have before observed of the common Spider, that it pierces the Flesh with its hooked Forceps, and at the same time Instills from the Proboscis in the Mouth a Liquid Venom into the Wound; so the like Claws in This, of which I have taken the Figure out (a) of P. Bonanni, very much magnified (b), do serve to make way for an active and penetrating Juice emitted from the same Part.

Or the Nature of which we may probably conjecture, that it is, when mix'd with the Blood, being exalted by the Heat of the Climate, of so great Force and Energy, that it immediately raises an extraordinary Fermentation in the whole Arterial Fluid, by

el(a) Vid. Fig. 19. notigies A find werturne of

⁽b) Micrograph. Curiof. p. 69.

which its Texture and Crafts is very confiderably altered; the Confequent of which Alteration, when the Ebullition is over, must necessarily be a Change in the Cohasion of its Parts, by which the Globules, which did before with equal Force press others, have now a very different and irregular Nifus or Action, fo that some of em do so firmly Cohere together, as to Compose Molecula, or fmall Clusters; upon which Account there. being now a great number of Globules contained in the same Space than before, and besides, the Impulse of many of these when uniting together differing according to the Conditions of their Cobesion, as to Magnitude, Figure, &c. not only will the Impetus, with which this Fluid is drove towards the Parts, be at some Strokes at least greater than ordinary, but the Pressure upon the Blood Vessels must be very unequal and irregular; and this more especially will be felt in them which are more eafily diffended; fuch are those of the Brain, &c. And hereupon the Fluid of the Nerves must necellarily be put into various Undulatory Motions, some of which will be like unto those which different Objects acting upon the Organs or Paffions of the Mind, do naturally excite in it, whereupon such Actions must follow

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follow in the Body, as are usually the Confequents of the several Species of Sadness, Joy, Despair, or the like Determinations of the Thoughts; and we shall readily pronounce one in this Condition, Sad, Joyful, Timorous, Sc. and all without any apparent Reason or Cause; that is in one Word, we shall say he is Delirous:

THIS is in some Degreea Coagulation of the Blood, which will the more certainly, when attended with an extraordinary Heat, as in the present Case, produce such like Effects as these, because the Spirits separated from the Blood thus inflamed, and compounded of Hard, Fixt, and dry Particles, must unavoidably share in this Alteration: that is. whereas their Fluid confifts of two Parts, One more active and Volatile, the Other more Viscid and Gluttinous, which is a kind of Vehicle to the former; their Active part will bear too great a Proportion to the Viscid and thus they must necessarily be of more than ordinary Volatility and Force, and will therefore, upon the least Occasion imaginable be irregularly determined to every part; and hereupon will follow Tremblings of the Body, Anger, or Fear upon a light or no Cause, extream Pleasure at what is but a tuni sumitia dani nogoveniw a niTrivial

Trivial Entertainment, as Red, Green Colours, or the like; and on the other Hand. wonderful Sadness at any thing not agreeable to the Eyes, as Dark and Black Things; nay Ridiculous Laughter, Obscene Talk and Actions, and fuch like Symptoms; because in this Constitution of the Nervous Fluid, the most light Occasion will make as real a Reflux and Undulation of it to the Brain; that is, will present as lively and vivid Species there, as the strongest Cause and Impression can produce in its natural State and Condition; nay, in fuch a Confusion, the Spirits cannot but fometimes, without any manifest Cause at all, be hurried towards those Organs, to which at other Times they have been most frequently determined; and every one knows which they are in hot Countries and Constitutions.

We must however here Remember what in the former Essay we mentioned of the Fluid of the Nerves, being immediately altered by the Venomous Juice.

It will perhaps make this Theory more than probable, to confider that (a) Baglivi in the Differration of a Rabbit kill'd by a

⁽a) Page 30.

Tarantula, found the Blood Vessels of the Brain very turgid, and the Substance of the Brain it felf, that is, the Beginning of the Nerves, lightly inflamed, and with livid Spots here and there, the Lungs and other Viscera distended, with concrete glotted Blood, and large Grumes of Blood with Polypous Branches in the Heart, a large Quantity of Extravasated Serum upon the Brain, which is (as he takes notice) mostly observed in those Subjects which died by a Coagulation of the Blood.

NEITHER is it amiss to remark, that in a Chlorofis there is nothing preternatural but an infaraus of the Arteries, and hence a retarded Circulation, from an Evacuation fuppress'd; and in this Country, too much Heat that is, a beginning Coagulation, together

with an Inflammatory Disposition,

In short, Bellini has at large demonstrated, how Deliria, as well Melancholic as Maniacal, do proceed from a State of the Blood and Spirits, not unlike to that I have

here described.

But no less a Confirmation of these Notions may we have from the Cure; as to which it is observable, that the Tarantat; have no Inclination to Dance before they hear the Musick; for being ask'd to do it, thev

they answer, It is Impossible, they have no Strength.

As for the Reason therefore of their starting up at the first Noise of the Instrument. we must reflect upon what we have just now been saying concerning the Cause of the Motions of the Body in a Delirium; and confider withal that Muscular Motion is no other than a Contraction of the Fibres from the Arterial Fluid making an Effervescence with the Nervous Juice, which by the light Vibration and Tremor of the Nerve is derived into the Muscle.

AND thus we have a Twofold Effect and Operation of Musick, that is, both upon the Mind and Body. For a brifk Harmony excites lively Species of Joy and Gladness, which are always accompanied with a more frequent and stronger Pulse, or an Increased Influx of the Liquor of the Nerves into the Mufcles, upon which fuitable Actions must immediately follow; and if we remember what we before hinted, that People in this Country are fprightly and ready to Exercise; and that in fuch a State of the Fluids as we have described, a slight Occasion presents as strong Species, as a greater can at another Time; the Influence of Musick on the Mind, will

Streeting (a) Of Langued and Universed Messon.

appear to be so much the more powerful and certain.

As for the Body, since it is sufficient for the purpose of putting the Muscles into Action, to cause those Tremers of the Nerves by which their Fluid is alternately dropt into the moving Fibres; is is all one whether this be done by the determination of the Will, or the outward Impulsions of an Elastic Fluid such is the Air; and that Sounds are the Vibrations of It, is beyond Dispute.

THESE therefore rightly modulated may shake the Nerves as really as the Imperium Voluntatis can do, and confequently produce

the like Effects.

THAT This is so, besides what we shall add anon, we may be convinced by a Story which Mr. Boyle (a) relates out of Scaliger, of a Knight of Gascony whom the Sound of a Bag-Pipe would unavoidably force to make Water; for this Secretion we know is regularly the Effect of an Arbitrary Contraction of the Muscles of the Bladder.

THE obstinate continuing of the Tarantati in this Exercise, is doubtless in a great Measure owing to the strong Opinion they have of receiving Advantage from it, being encouraged by the By-standers, and having always believed, and been told, that it was the only Cure in these Cases.

THE Benefit from Musick is not only their Dancing to It, and so evacuating by Sweat a great Part of the Inflammatory Fluid; but besides this, the repeated Percussions of the Air hereby made, by immediate Contact fhaking the Contractile Fibres of the Membranes of the Body, especially those of the Ear, which being contiguous to the Brain, do communicate their Tremblings to its Membranes and Veffels; by these continued Succustions and Vibrations, the Cobation of the Parts of the Blood is perfectly broken, and its Coagulation prevented, so that the Heat being remov'd by Sweating, and the Coagulation by the Contraction of the Muscular Fribrilla, the wounded Person is restored to his former Condition.

Is any one doubts of this force of the Air, let him confider that it is in Mechanicks (b) Demonstrated, that the smallest Percussion of the smallest Body, can overcome the resistance of any great Weight which is in Rest; and that the Languid Tremor of the Air, which is made by the Sound of a Drum or

⁽b) Boelli De Vi Percuffion, Prop. 90. and. 111.

Trumpet, may shake the vastest and strongest Edifices.

Bur besides all this, We must allow a great deal to the determinate Force, and particular Modulation, of these trembling Pers custions; for contractile Bodies may be acted upon by one certain Degree of Motion in the ambient Fluid, tho' a greater Degree of it differently qualified may produce nothing at all of the like Effect, this is not only very apparent in the common Experiment of Two String'd Musical Inftruments, tuned both to the same Height, the Strings of the one being ftruck upon, those of the other will found, and yet a much greater Motion of the Air may not Cause any sensible Vibration at all in the same Chords; but also by the Trick which many have of finding the Tone or Note, peculiar belonging to any Wine Glass, and by accommodating their Voice exactly to. that Tone, and yet making it loud and lasting, they will make the Veffel, tho' not touch'd, first to Tremble, and then to Burft. which it will not do if their Voice be but a little either too low or too high. You to this

This last Consideration makes it no very difficult matter to conceive the reason, why different Persons, infected with this Venom, do require oftentimes a different Sort of Musick.

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in order to their Cure, in as much as their Nerves and Distractile Membranes have different Tensions, and consequently are not in like manner to be acted upon by the same Vibrations.

Nor are we to wonder at the Oddness of this Method and Practice; for Musick, althout the Now-a-days applied to quite different Purposes, was antiently made great Use of for the removing of many, and those too some of the most difficult and obstinate Diseases.

FOR this we have a Famous Testimony in Galen himself (a), who tells us, that Æsculapius used to recover Those in whom violent Motions of the Mind had enduced a bot Temperament of Body by Melody and Songs. Pindar (b) mentions the same thing; and indeed from hence not only the Notion, but the very Name of Charming (c) seems to have taken its Origine. Atheneus (d) relates that Theophrastus in his Book of Enthusiasm says, Ischiadick Pains are Cured by the Phrygian

divins

⁽a) De fanitate Tuenda, lib. 1. c. 8. 100 1 (c)

⁽b) Pythior. Od. 3. padanais exapidais. Vid. ibid. Scholia.

⁽c) A Carmine, latin stoles ellechib chantiglag jast

⁽d) Deipnosoph, 1. 14. p. m. 624.

Harmony. This fort of Musick was upon a Pipe, and the most vehement and brisk of all the Antients knew; so that indeed it was said to raise those who heard it to downright Fury and Madness (e): And such we have observed to be required to the Venom of the Tarantula.

But what is besides in this last Authority very observable to our Purpose, is the manner of using this Remedy, and that was (f) by Playing upon the Part affected, which confirms what we have just now advanced concerning the Effect of the Percussion of the Air upon the Contractile Fibres of the Brain: for Piping upon any Member of the Body. cannot be supposed to do Service any other way than by fuch Succuffions and Modulated Vibrations as we before mentioned. And this indeed Calius Aurelianus (g) agrees to. who calls this Practice, Decantare Loca dolentia; and fays, that the Pain is mitigated and discuss'd by the Tremblings and Palpitations of the Part.

wo the Ti

⁽e) Vid. Bartholin. de Tibiis Veter. I. 1. c. 9.

^{· (}f) Εἰ καθαυλήσοι τὸς το τόπο τῆ Φρυγιοὶ άρμονία.

⁽g) Morb. Chronic. l. 5. c. 1. Quæ eum saltum sumes vent, palpitando discusso dolore mitescerent.

Aulus Gellius (a) not only relates this same Cure of Ischiadick Ails as a thing notorious enough, but adds besides out of Theophrastus, that the Musick of a Pipe rightly managed healed the Bites of Vipers.

AND not only does Apollonius (b) mention the Cure of Distractions of the Mind, Epilepsies, and several other Distempers this same way; but Democritus (c) in his Treatise of Plagues, taught, that the Musick of Pipes was the Medicine for most Diseases; which Thales of Crete confirm'd by his Practice, when sent for by the Lacedamonians to remove from them the Pestilence; he did it by the help of Musick (d):

All which Instances do evince this Remedy to have been very antient in many Cases; and indeed as Calius Aurelianus (e) takes notice, that the first Use of it was ascrib'd to Pythagoras himself, so He having settled and sounded his Sect in those very Parts of Italy which are the Country of the Tarantula, going then under the Name of

⁽a) Noct. Atticar. 1. 4. c. 13.

⁽b) Histor. Mirabil.

⁽c) Apud Aul. Gell. 1ec. citat. Plurimis hominum Morbis Medicinam fuisse Incentiones Tibiarum.

⁽d) Plutarc. de Musica.

⁽e) Loc. ante cit,

Grecia magna, now Calabria; it is not, I think, at all improbable that he may have been the Author and Inventor of this Practice there, which has continued ever fince. Especially since Jamblicus affirms (g), not only that he made use of Musick in Physick, but particularly that he found out and contrived some Harmonies to ease the Passions of the Mind, and others for the Cure of Bites: But of Musick enough.

To conclude with this Poison, we may take notice that, as to the Return of the Symptoms the next Year, That is owing to the same 'excessive Heat in those Months, acting again upon the small remains of the Venomous Ferment; thus Bartholin (b) relates a Story of a Melancholy Physician at Venice, who suffered the Attacks of his Disease only during the Dog-days, which yearly ended and return'd with them. A convincing Proof how great a share Heat has in all these Cases.

Remark Mr gotted and and the last field with sidnered

((b) Hiftor, Anatom, Cent. 2. H. 20. 14 A.

⁽g) De Vit. Pythagor. cap. 25. mpds dnypuis Bondan-

Of the Mad Doo

The Mad Dog?

ORE difficult and terrifying are the Symptoms from the Bite of a Mad Dog, whose Venom has this also surprizing in it, that the bad Effects do not appear of ten times till the Cause of 'em is forgot; for the Wound is as easily cured as a Common Bite is; but nevertheless a considerable time after, a melancholy Tragedy fucceeds, fome times fooner, fometimes later; for there are Instances of its being deferr'd to two, (k) Six Months, nay, a Year, and longer, tho the attack is generally within Forty Days after the Wound; about that time, the Patient complains of Running Pains all over his Body, especially near the Part wounded, like unto those in a Rheumatism, grows pensive and fad, prone to Anger upon little or no Occasiion, with an intermitting Pulse, Tremblings and Contractions of the Nerves, with a great inward Heat and Thirft; and yet in a few Days (when the Difeate is come to its

⁽k) S. Ardoyn de Venen. page 381.

height) a Dread and Fear of Water, and any Liquor whatfoever; fo that at the very Sight of it he falls into difinal Convulsions and Agonies, and cannot drink the least Drop; and this Hydrophobia, or Aqua Timor, has been always accounted the furest Sign and Mark of this Poifon, as diftinguishing it from all others.

THE Antients have at large described these Symptoms, as Galen, Dioscorides, Actius, Agineta, but most particularly of all, Calius Aurelianus (a); and later Writers have given us feveral Inflances of the Hydrophobia; Two Histories of It published, the one by Dr. Lister (b), the other by Dr. Howman (c), I shall more especially take Notice of, and refer to, as containing the most exact and large Account of any I have met with; he that defires more may confult the feveral Authors cited by that diligent Observer, Stalpart van der Weil (d):

THAT this Difease is accompany'd with a Delirium, is almost the common Opinion both of Antients and Moderns; Demo-

(Male)

⁽a) De Morb. Acut. tib. 3.

main brewn (b) Exercitat. de Hydrophob.

⁽c) Philosoph. Transad. No. 169.

⁻⁽d) Observ. Rarior. Centur. 2. obs. 100.

⁽e) Vid. Galen de Theriac. ad Pison, l. 1. cap. 16.

Dr. Lister agrees in this Point with Petrus Salius Diversus (g) and will not allow a Dellirium to be the necessary consequent of this Venom; and yet at the same Time he tells us, that his Patient barked like a Dog, and bit at the By-standers; and that he threw into his Mouth what was given him more hastily and suddenly than it is natural or customary for Men to do.

FROM fuch Actions as these, together with those mentioned before in relating the Symptoms, it is obvious enough to conclude that Persons thus affected, are in a proper Sense Delirous. Tho at the same Time I do think that the Hydrophobia it self (what ever is commonly believed) does not at all proceed from this Delirium, as will by and by appear.

I know indeed that the main and plausible Objection against a Delirium is this, that the Patient himself does Reason against his Timorousness, tho' he cannot overcome it, forewarn the Standers by of his Outrageous

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CANT

⁽f) Пиракония отакняя apud Galen. de Antidot.

⁽g) De Hydrophob;

Fits, defires them to take Care of themselves and the like. Which from what I have already faid concerning a Delirium, appears to be very confiftent with it, nav, convinces that there is the greatest Degree of it in this Cafe: in as much as that is not a Diffemper of the Mind but of the Body. And to this purpose I remember to have seen my self an Inflance of one in a Fever, who foretold fome time before any Signs of a Delirium was discovered, how raving and unruly He fhould be, and made good his Prognofick to that Degree, that it was very hard Work to Tame and Mafter him; tho', as he told me afterwards, he reason'd as much as he could against that groundless Jealousy of his Friends defigning to Murder him, which put him upon his Mad Actions, but was not able to Conquer the prevailing Species of Fear and Anger, is wish s

This Delirium therefore, as Calius Aurelianus (g) fays, Proceeds intirely from an Indisposition of the Body, which is without all doubt owing to the Alteration made in the Blood by the Saliva of the Mad Dog, instilled into the Wound inflicted by the Bite.

⁽g) Loc. citat Tota oritur ex corporis ipsius mala Affectione.

THAT we may rightly understand this we must take Notice, that the Rabies or Madness in a Dog is the Effect of a violent Fever; and therefore it is most common in excessive hot Weather, tho', fometimes intense Cold may be the Cause of it, that no Dog ever Sweats; from whence it follows: that when his Blood is in a Ferment, it cannot, as in other Creatures, discharge it felf upon the Surface of the Body, and therefore must of Necessity throw out a great many Saline and active Particles upon those Parts! where there is the most constant and easy Secretions and fuch next to the Miliary in the Skin in us are the Salival Glands; for this Reason much more Spittle is separated in a Dog when Mad, than at any other Time, and that very frothy, or impregnated with Hot fubtil Parts. havrilde good and it an flui

Now as we every Day observe that what is thrown out from Liquors in a Ferment, is capable of inducing the like Motion in another Liquor of the same Kind, when duly mixed with it; so we may very well suppose in the present Case, that the Saliva, which is it self one of the most Fermentative Juices in Nature, being turgid with Fiery Saline Particles thrown into it out of the Boiling Blood, when it comes by Means of a

wound to be incorporated with the Arterial Fluid of any one, does by Degrees raile a preternatural Effervescence in It, the Effects of which will necessarily be most felt in those Parts, which being tender, are the least able to resist the Distension of the Blood Vessels, such are the Stomach, and especially the Brain, and hereupon Deliria, with Maniacal and such like Symptoms, will cast-

ly Infue.

MOUDA

A Person thus affected may be said in a Degree to have put on the Canine Nature, tho' his Reason be all this Time untouch'd and intire, may Bite, Howl, Est because the like violent Agitation of the Blood in him as was in the Dog, will prefent like Species, and consequently (fo far as their different Natures will allow) produce like Actions; just as it has been observed, that Sheep bitten by a Mad Dog, have run at the Shepherd like to many Dogs to bite him; fo much can an Alteration of the Blood and Spirits do. And as a Timorous Creature may be imboldened, fo we oftentimes fee Perfons Courageous enough by a Change made in the Blood by Evacuations, that is, by Want of Force and Motion in that Fluid, made sheepish Cowards, in Despite of their Reason, so long as that Defect is continued.

Bur the main Difficulties in this Matter are, the Mischief discovering it felf to long after the Bite, and the Hydrophobia

As to the former we are to confider, that

Fermentation being a Change made in the Cohalion of the compounding Parts of a Fluid, it is fometimes a longer, fometimes a shorter Time before this Alteration is wrought, which Variety may proceed either from the different Nature and Constitution of the Ferment, or of the Liquor Fermented. and a great Number of Circumstances befides. So that this Venom may be all the while doing its Work, tho' the Change made by it may not be fo confiderable as to be fenfibly taken Notice of till a long Time

NAY, it may fo happen; that the Ferment being Weak may not raife in the Blood any remarkable Agitation at all, till fome accidental Alteration in the Body unluckily gives it an additional Force. As we before observ'd, how much external Heat concurs to heighten the Symptoms from the Bite of the Tarantula. And this probably may be the Case of Those in whom this Malignity saffing the Nervous Vambraness the very M

has not appeared till Six, or Twelve Months

THAT we may understand the Reason of the Hydrophobia, it is to be remarked, that this dread of Water does not come on till the latter End of the Disease, Three or Four Days before Death; that is, not till this preternatural Fermentation in the Blood is come to its Height; and as in the Dog, so in the Patient, a great Quantity of Fermentative Particles is thrown off upon the Glands of the Mouth and Stomach, as appears by his Foaming at the Mouth, &c.

of As alfo, that this Fear is not from a Sight of, or any Imaginary Appearance in the Water, for if the Vellel be close thut, and the Patient hid to fuck thro' a Quill, as foon as he has tafted; he falls into Anguish and Convolfions, as Dr. Lifter observed. It is therefore highly probable, if not certain, that this furprifing Symptom proceeds from the intolerable Pain which any Liquor at this Time taken induces, partly by hurting the inflam'd Membranes of the Fauces in Deglutition; partly by fermenting with these Active Particles discharged by the Blood upon the Sigmachin Glands, and thus twitching and irritating the Nervous Membranes; the very Memory

mory of which grievous Sense, after it is once felt, is so terrible, that the affected Person chuses any thing rather than to undergo it a second time.

THE Effects of this Irritation are manifest in the Convulsions of the Stomach, and frequent Singultus, with which the Patient is continually oppress'd. And we all know by how necessary a Kind of Mechanism we do fly from and abhor those things which have been proved disagreeable to the Animal Occonomy to which nothing is so contrary and tepugnant as Pain; at the first Approaches of which, Nature Starts and Recoils, tho Reason be armed with never so much Courage and Resolution to undergo the Shock.

Nor will any Body wonder how this Ferment should cause such Torment, who considers how often, even in Cholical Cases, Persons are downright distracted by excessive Pain from a Cause not unlike to this we are treating of, that is, from a corrosive Ferment in the Bowels, rarefying the Juices there into Flatus, and by this Means irritating and stimulating those tender Membranes into Spasmodic and Convulsive Motions.

AND indeed Dr. Lister's Patient told him, that the very Swallowing of his own Spittle put him to such Torture in his Stomach, that G3 Death

Death it felf was not fo terrible as the inex-

prellible Agony.

Ir may ferve both to Illustrate and Confirm this Theory to take Notice, that not only many (according to these Principles) other Bites besides that of a Dog happen to induce the like Symptoms; thus (a) Molpighi relates a Story of a Mother made Hydrophoba, by the Bite of her Epileptick Daughter; but that there are other Cases without any Bite at all, which are attended with an Hydroto which nothing as phobia.

THUS Sebenkius (b) Salmuth (c), and others, have observed a Dread of Water, without any Suspicion of a Bite from Malignant Fevers. Now in Thefe there is doubt-Iels a Hot, Putrid Ferment in the Blood; and it is no wonder if part of it be discharged upon the Throat and Stomach, which we do evidently find in these Distempers to be more particularly affected by it, especially towards the latter End, from the Aphibe Singultur, and the like usual Symptoms of a fatal Malignity: wolf end of hear man I ofne

(a) Oper. Posthum. p. 55.

⁽b) Observ. de Venen. Animal.

⁽c) Observ, Cent. 2. Obs. 52.

NAY, Hip pocrates (d) himself seems more than once to have remarked something like this Symptom in Fevers, and to call those who were thus affected Brazomolau or little Who were thus affected Brazomolau or little Drinkers; for I cannot assent to Dr. Lister, (tho' Calius Aurelianus be on his Side) who thinks that the Brazomolau are idpoposos from the Bite of a Mad Dog; as well for other Reasons, as because Plutarch (e) assures us, that the Hydrophobia and Elephantiasis were both first taken Notice of in the Time of Asclepiades the Physician, who liv'd in the Days of Pompey the Great, many Years later than either Huppocrates or Aristotle.

NEITHER is it amiss to add, that Joannes Faber (f) in the Diffection of one who died at Rome of the Bite of a Mad Dog, and a Hydrophobia succeeding it, found the Blood Coagulated in the right Ventricle of the Heart, the Lungs wonderfully Red and Tumified; but especially the Throat, Stomach, and Bowels, bearing the Marks of the Instammatory Venom.

THE same Observation has been made by others in Bodies Dead of this Disease. Thus

SELEC

⁽⁴⁾ In Prorrhetic. & coac. & alibi. ... In Indian

⁽e) Symposiac. 5. 9. (f) Apud Hernand. & Recch. Plantar. & Anim. Mexicanor. Histor. p. 494.

the Asta Medica Hafnienfia (a) relate one Cafe, in which part of the Liver was Inflamed, the Lungs Parched and Dry, and the inner Coat of the Stomach so Mortified, that it might be abraded with one's Fingers.

BONETUS (b) tells another, where all the Vifcera were found quite arid, without any Tuice at all. we as gold ball a lo still all

AND in a very particular History of an Hydrophobia, lately published at Ulm (c), We are informed that the Stomach, when opened. discover'd the Marks of an Erosion or Excoriation, with fomething like a Gangrene, and a Suffusion of Blood here and there Which does very well agree with the Ob-Tervations in the German Ephemerides (d) where we find several Footsteps of a Sphacelus or Mortification in the Bodies of those who died Hydrophobi. Andre bett me better 1930

THE Cure of this Poilon is either immediately upon the Wound made, or fome Days after before the Fear of Water is difcovered; for at that time all Authors do

A U

⁽a) Vol. 5. Obf. 114.

⁽b) Sepulchret. Lib. 1. Sed. 8. Obf. 8.

⁽c) Bossini Lentillii Dissertatio de Hydrobiæ Causa Cura. (1) Eph. Cur. Dec. 3. Ann. 2. Obf. 104: offill .100501 & Cura.

agree the Malady to be Incurable; and the Reason is plain from what has been already delivered.

As in other Venomous Bites, so in this, Galen (e) very wisely advises to inlarge the Wound, by making a round Incision about it, to Cauterise it with a hot Iron, and apply drawing Medicines, so as to keep it a running Ulcer at least Forty (f) Days. Scarifying and Cupping may answer where this Severity is not allow'd: And however, the Dressing it with Unguentum Egypticum (or the like) Scalding Hot, must not be omitted; by which alone, timely applied I am assured that one Bitten was happily, preserved.

But where these Means of destroying the Ferment in the beginning are omitted, the dangerous Consequences of its being mixed with the Blood is by all possible Care to be prevented.

To this purpose, to say nothing of the many Inconsiderate Jumbles of Antidotes, Theriacas, &c. nor of such vulgar Trisles as the Liver of the Mad Dog, of which

o Million, Name at the art of Carlos

⁽e) De Theriac, ad Pison. 1, 1, 5, 16.

⁽f) Vid. Actium, 1. 6. 6- 24.

Galen (a) observed, that the some who made use of it, together with other good Medicines, recovered, yet that they who trufted to it alone died; one of the greatest Remedies commended to us by Antiquity. is the Cineres Cancrorum Fluviatillium: which Galen (b) fays, no Body ever made use of, and miscarried; and before Him Diascorides (c) affured, that 'tis a Medicine may be rely'd on. These were given in large Quantities, wiz. a good Spoonful or Two every Day for Forty Days together, either alone, or rather mix'd with the Powder of Gentian Root and Frankingense. The Vehicle was either Water or Wine. In like manner at this Day the Remedy in the greatest Repute of any against most Poisons in the West Indies is a kind of a River Craw-Filb call'd Aratu (d)

This is manifestly an Absorbent, and very Diuretic Medicine, especially when prepared after the right manner, which was by Burning the Craw Fish Alive upon a Copper Plate, with a Fire made of the Cut-

⁽a) Simpl. Medic. Focult. l. 11. c. 1.

⁽b) Ibid. 1. 11. 2. 34. A said the said for (b)

⁽c) Theriac cap. 2. A same sate fliv (1)

⁽⁴⁾ Vid. Pison Histor. Nat. & Med. Ind. lib. 5. c. 16 tings

tings of Twigs of White Briony: For whether the latter part of the Management fignifies much or no, the former most certainly does; and the Salts of the Copper, which powerfully provokes Urine, being mix'd with that of the Ashes, may very much exalt their Virtue.

AND it is upon this same Score, that the Spongia of the Cynorrhodos or Roja Sylvestris is fo celebrated an Antidote, not only for this Poison, but also for that of the Viper, Tarantula, and others too, that 'tis call'd in Sicily Sanatodos, or All-heal; this being not a Vegetable, as P. Boccone (e), who has wrote a whole Letter of its wondrous Virtues, terms it, but an Animal Alcali, as well as the former; for Mr. Ray (f) has observed, this Spongy Excresence, if it be cut, is found full of White Worms; being the Nests of these Infects, which lodging here all the Winter, do in the beginning of the Spring turn to Flies, and quit their Quarters. Indeed this Remedy was antiently too of fo great Effeem, that Pliny recommends it as the only Cure of an Hydrophobia, divinely discovered by an Oracle (g).

⁽e) Museo di Piante rare Offervaz. ... nanaV of (d)

⁽f) Histor. Plant. Tom: 2. P. Dayr. 19 ib oshuM (1)

⁽g) Hiftor. Natur. l. 8. c. 41. & 1. 25. c. 23

As all Infects abound with a Diuretick. Salt, so Cantharides more than any others; therefore the Learned Baccius (b) goes farther; and from the Authority of Rhazes and Tobannes Damascenus, advises to give these in Substance for many Days together. The Preparation of this Antidote, (so he calls it) is by infufing the Cantharides in Soure Butter-milk Twenty-four Hours, then drying them, and with the Flower of Lentils and Wine making 'em up into Troches of a Scruple Weight, of which one is to be taken every Day. By which means he affures us, that tho' the Patient make bloody Urine, yet that Milk largely drank will abate that Symptom, and that an Hydrophobia will be happily prevented, Boccone (i) tells Us, That in Upper Hungary they give Cantharides to Men bitten by a Mad Dog, Five to a Dofe; and to Beafts in greater Quantity. But of the inward Use of these Plies more in its proper Place.

In short, all the Specificks in this Case are fuch as do either absorb a peccant Acidity in the Stomach, or carry it off by Urine; as Terra Lemnia, highly commena. divinely discovered by an Oracle?

(b) De Venen. p. 80. 200 () ster straff ib oaluM ()

⁽i) Muleo di Pilica, Offervazi 21, tasi 9 . oni H (1) Ray Hillor, Natur. l. 8. c. 41. & l. 25. c. 22

ed by Galen (k), Garlick, Agrimony Oxylapathum, and many others, of which a Catalogue may be seen in St. Aidoynus. So the Alyssum or Madwort celebrated for this use by the Ancient Physicians, as well that described by Dioscorides, which is a Species of Leucoium, as the other of Galen, which is a Marrubium, is very manifestly a Bitter, Stomachic, and Diuretick Plant (l). The Lichen cinereus terrestris, recommended in the Philosophical Transactions (m), Operates the same way.

But the greatest and surest Cure of all is frequent Submerging or Ducking the Patient in Water. The first mention I find of this is in Cornelious Celsus (n); whether he had it from the Ancient Grecian Physicians, or it was the Discovery of his own Age, matters but little to our Purpose, certain it is that he collected his Principal Rules of Bathing from Cleophantus, who, as Pliny says (o), did, besides many other delightful things, first introduce the Use of Baths;

many, yet that never one m

(5: Orlere, 20.

⁽k) Medicam. facult. lib. 9. c. 1.

⁽¹⁾ Fab. column. Phytobalan. p. 27.

⁽n) Lib. 5. c. 27.

⁽⁰⁾ Nat. Hift. 1. 26. c. 3.

As appears by comparing the Writings of the One with the Fragments of the Other, preserved in the Works of Galen. And that from Asclepiades, who afterwards so far improved this Part of Physick, that he discarded almost all inward Medicines, he might learn this Management, is not improbable; for the Hydrophobia (as we before took Notice) having been first regarded in the Time of this great Physician, tis very likely that among other Advantages of his new Method, he might commend it for the Cure of so deplorable a Malady.

However it be, This Practice was in this last Age with great Authority reviv'd by the ingenious Baron Van Helmot, (a) who having in his own Country seen how great Service it did, has at large set down both the manner of the Operation; and, Consonant to the Principles of his own Philosophy shewn the Reason of its good Effects. Since him Tulpius (b), an Observer of very good Credit, takes Notice, that the he saw many, yet that never one miscarry'd, where

it was in time made use of.

⁽a) Tr. Demens, Idea.

As all Baths do chiefly act by the fenfible Qualities of Heat and Cold, and the Gravity of their Fluid; fo we need go no farther to fetch the Reason of the great Advantage of this Method in the present Case, than to the pressure of the Water upon the Body of the Patient, bened victori med

EVER y one knows how plentifully plunging into cold Water provokes Urine, which proceeds no doubt from the confiction hereby made of the Fibres of the Skin and Vessels. Thus this outward Cure differs not much in effect from the inward Media cines before mentioned, but must necessarily have the better of them in this Respect, that when the Fermenting Blood fretches ats Vessels, the exceeding weight of the ambient Fluid refifts and represses this Distension, and fo prevents the Effects of It. For this Reafon the Salt Water of the Sea is especially chosen for this Bufinels, because its greater Gravity than that of Fresh does more powers fully do all this, and break the beginning Cohasion of the Parts of the Blood of a Haid

Thus we may, without having recourse to the Fright and Terror, with (which this Method, when rightly practis'd, (by keeping the party under Water for a confiderable Time, till he is almost quite drowned) Slu

is usually accompanied, probably enough account for the Advantages of this Immerfion. Tho' it is not unlikely that this new Fear may have some good Effect in the Cafe too, for not only Convulsions, but Agues, and other Diseases, have oftentimes been happily Cured, merely by terrifying and furprifing the Patient, and and year

THE Reason of this will easily be understood by him who knows what Alterations the Passions of the Mind do make in the Fluid of the Nerves and Arteries ; of

which in another Place I both ou down how

It may for our present purpose suffice to take Notice, that as in Confideration of the last mentioned Effect upon the Mind, Van Helmont commends this same Practice in all forts of Madness, and Chronical Deliria fo upon the Account of the before hinted Alterations on the Body, Bathing was, among the Antients, the common Cure of Melancholy, and fuch like Diffempers (c). And as the younger Van Helmont (d), to confirm his Father's Notion, tells Us, that one Dr Richardson did with wonderful Success make Ericht and Torrer, with

⁽c) Vid. Aretæum Cappad. Car. Diut. l. 1. c. 5. Et Actium. 1. 6.c. 11. (d) Tr. Man and his Difeafes. an ile amil' old

use of this Management in these Cases, fo in like manner Prosper Alpinus (e) takes Notice. that the Egyptians do at this Day perfectly recover Melancholy Persons by the same Method, only with this Difference, that

they make their Baths Warm.

He that compares what has been already advanced concerning Deliria, with the Bellinian Theory of Melancholy and Maniacal Diftempers, and reflects upon the Nature of Baths, and their manner of Acting, will see so much Reason in this Practice, as to be forry that 'tis Now-a days almost quite laid aside and neglected. For we must observe, that altho' there be some difference in the Treatment and Cure of Deliria, whether maniacal or melancholy, when they are Originally from the Mind, as the Effects of Care, Trouble, or the like, and when from an Indisposition of the Body; yet that both do agree in this, that they require an Alteration to be made in the Blood and Spirits; inasmuch as the Mind by often, nay, almost continually, renewing to it self any one Idea, of Love, Sorrow, &c. does fo constantly determine the Spirits and Blood,

⁽e) Medecin. Ægyptior. l. 3. c. 19.

one and the same way, that the Body does at last as much share in the Alteration, as if it had been primarily affected, and confequently must have in some manner the same Amendment. Upon this score Baccius (f) afferts the admirable use of Temperate Baths in all kind of Distractions; and assures us, that not only common Deliria, but even the Damoniaci, Phanatici, Lycanthropi themselves, Sc. are cured by frequent Washing in fresh Water, and a Moist and Nourishing Diet.

But to infift on this Subject is foreign to our purpose; only in regard that the most usual Methods of Cure in these Cases are so very tedious, and oftentimes unsuccessful at the last, I thought it not amiss to hint thus much, in order to the advancing something more Certain and Essectual towards the removal of the greatest Unhap-

pinels to which Mankind is liable.

To conclude with the Hydrophobia; where these Remedies sail, or are Administred too late, the Patient, from the prevailing inflammatory disposition of the Blood, grows more and more Delirous,

⁽f) De Therm. 1. 7. 6. 22.

and by Degrees downright raving Mad, at last (as it most commonly happens in Maniacal People) suffers a total Resolution of Strength, and Dies. Thus Dr. Howman's Case ended in a perfect universal Paralysis.

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Poisons Minerals

THE AMERICAN STREET

H2 ESSAY

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A LTHO there he a great variety of A faternal Pajons, as well Maderal in Negrindle; yet they do all of em feem to agree in their Frimary I of Es, and Manner Townson and a shart with or Stings of Frigues of Friedmann Stings of Conflantly infofice.

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ESSAY the Third.

OF

Poisonous Minerals

AND

PLANTS.

A LTHO' there be a great variety of Internal Poisons, as well Mineral as Vegetable; yet they do all of 'em seem to agree in their Primary Effects, and Manner of Operation; and as the Teeth or Stings of Venomous Animals do constantly insuse a Juice into the Wound they make, by which the Mass of Blood is insected; so the Force of These is chiefly confined to the Stomach and Prima Via; and tho' It may in some Cases

Cases be communicated Farther, yet the Principal Mischief is done in These Parts.

DELETERIOUS Medicines, says Dioscorides, are many, but the Alterations made by them in the Body common, and but few (a).

OF all this kind, those of a Mineral Nature are the most violent and deadly, the greater Gravity and Solidity of their Parts giving to these a Force and Action surpassing the mischief of Vegetable Juices; and there fore whereas noxious Plants do vary their Effects in different Creatures, fo as to prove harmless, nay, perhaps Beneficial and Nutritive to some, as Hemlock they fay is to Goats (b) and Sterling (c), and Henbane to Hog (d), the Strength of the Stomach in These Animals being sufficient to conquer and divide fuch corrolive Substances, and their Blood perhaps requiring to be recruited by fuch warm and active Particles; A Mineral Malignity is not, at least so far as we know, conquerable by any, but becomes univerfally hurtful and deftructive

⁽α) Ποικέλα μεν γαρ τα δηληθήρια φάρμακα, κοιταί δε καίδ σολαί εκ αθών γιυόμεναι διαθέσεις. Alexiph. p. 199.

⁽b) Lucret. lib. 5.

⁽c) Galen. Simpl. Medic. 1. 3, cap. 18.

⁽d) Sext. Empiric. Hypoth. Empiric. 1.

WE shall here give the first Place to Mer-

cury Sublimate.

This is no other than a Mixture of Quickfilver with common Salt. The way of preparing it, as'tis made at Venice, from whence great Quantities are fent into other Countries, Tachenius has given us in his Hippocrates Chymicus (e); as to which we must observe, that the there be always added a Proportion of Salt-Petre, and Calcin'd Vitriol to the other Ingredients, yet these do not enter into the Composition, but only serve to facilitate the Work; as abundantly appears from this Experiment, That Mercury fublim'd with the same Proportion of Nitre and Vitriol without Marine Salt, neither receives any Increase of its Weight, nor acquires any malignant Quality.

THE Effects of this Poison when taken are, violent Griping Pains, with a Distension of the Belly, Vomiting of a slimy frothy Matter, sometimes mixt with Blood, and Stools of the same, an intolerable Heat and Thirst, with Cold Sweats, Tremblings, Convulsions, &c. as will appear from the follow-

ing History (f).

⁽f) Wepfer de Citut. Aquatic. pag. 300.

To a large Dog was given a Drachm of Mercury Sublimate, mixt with a little Bread; within a quarter of an Hour he fell into terrible Vomitings, caffing up frequently a Vifcid, frothy Mucus, every time more and more Bloody, and purged the same downwards; till tired and spent with his hard Service, he laid down quietly as it were to

Sleep, but died the next Morning.

THE Abdomen being opened, a great Quantity of extravafated Blood was found between the Liver and Stomach, and between the Duplicature of the Omentum about the Stomach; the Guts as well as the Stomach were distended, and full of a frothy Bloody Mucus; on the outside they were of a livid Colour, within all over red, and inflamed down to the very Radum; the Fibrous Coat of the Stomach being taken off, between that and the Nervous one, grumous Bloodwas found in feveral Places; the like was discovered here and therein the Intestins between the same Coats

THE same Symptoms with these, and manifest Signs of a Burning Corrosion follow'd with Ulcers in the Bowels, Baccius (g) obferved in a young Man Poison'd by Subli-

mate mixt with his Meat.

BOST

What we are here chiefly to examine is, how from Ingredients fingly Innocent and Harmlels, so Mischievous a Compound can result; for as the Case is very plain with respect to Salt, so it is likewise now Notorious enough, that Quicksilver it self, which the Ancients, Dioscorides, Galen, Pliny, &c. have unjustly ranked among Poisons, is in many Diseases inwardly taken of very safe and beneficial Use; and that not only when disguised with Sulphur, Sugar, &c. but Crude, without any Correction, or vainly pretended Mortification.

This the Arabian Physicians first gave the Hint of; Avicen (b) having observed, that They who drink it in a large Quantity receive no Hurt, its Weight making a free Passage thro' the Body. This was Incouragement enough for the Practice of giving whole Pounds of it in the Iliac Passon; which is oftentimes done with good Success, without any frightful Symptom accompanying the Advantage received from its Ponderosity.

AFTERWARDS it plainly appeared that this Mineral, tho not taken in 6 great a

⁽b) Can. Medic. l. 4. Fon. 6. Argentum Vivum plurimum qui bibunt non læduntur eo; egreditur enim cum dispositione sua per inferiorem regionem.

Dose

Dose as could immediately force its way thro' the Intestins, even when it was lodged for some Time in this or that Part, was not at all hurtful by any Corrosive or Malignant Quality, And (i) Follopius, (k) Brasavolus, with Others of great Note, confirmed its harmless Efficacy in the Cure of the Worms, not only in adult Persons but even in the more tender Constitutions of Children.

Nos are these the only Cases in which good Service may be had from this weightw Fluid: he that rightly confiders the State of the Animal OEconomy, the Various Alterations it fuffers from the Stagnation of its more Viscid Juices in the smallest Canals, and how much the Impulse and Force of the Circling Blood, by which Obstructions are to be removed, must be increased by its carrying along with it fuch Particles as the Mercurial Globuli, will perhaps fee good Reafon to allow, that the prudent and cautious Management of Quickfilver may do that in some obstinate and dangerous Diseases, which we cannot promise our selves from any other of our own known Medicines whatfoever.

⁽i) De Morb. Gallic. Cap. 26.

⁽k) Vid. Angel. Salam in Hemetolog. p. m. 504.

Bur I am not to infift on this Head; and the learned Author of the New Theory of Fevery (1) has already most ingeniously explain'd the Mechanism by which fuch Effects as these are produced in the humane Body. It fuffices to my prefent purpole, to have proved that pure Mercury is not Poisonous or Corrofive, and therefore not only have I feen two Ounces of it given every Day for One and Twenty Days together, without any Inconvenience at all; but found once fome Quantity of it in the Perinaum of a Subject I took from the Gallows for a Diffection, (whose rotten Bones quickly discovered what Difeafe it was had required the Use of it, and that I suppose chiefly in External Application by Unction) without any mark of Corrolion of the Part where it was lodged. home in work

Tho' withal we may upon this Occasion remark, that the extreme Gravity of this Mineral alone, however serviceable it may be in other Respects; yet when it happens in so great a Quantity to Obstruct the Capillary Ducts, as that the Force of the Circling Fluid is not sufficient to wash it away, must necessarily induce Symptoms trouble some and bad enough, as Spasms, Contractions, Pal-

rod

⁽¹⁾ Fag. 91: & feq.

fies, &c. which they do commonly Experience who have either been too often daubed with Mercurial Ointments, or for a long Time imploy'd in rubbing the Quickfilver upon Looking Glasses; for the Internal Use of it will never produce any such Mischiefs.

As for Sublimate then, most certain it is, that the Saline Particles do impart to the Mercury this Malignant Quality; or to speak more properly, That the Salt, receives from the Mercurial Corpuscles such an Increase of its Gravity and Momentum, as renders its Cutting Corrosion more Effectual and Penetrating; for the Manner after which this Mat-

ter is done, is plainly this.

THE Globules of the Mercury, tho' fo minutely divided by the Action of the Fire, as to rife in the Form of a Fume, yet are still Solid and Ponderous Bodies; 'tis all one to the present Purpole, whether we suppose 'em perfectly Spherical, or with the learned Gulielmini (a) Spheroidical, for in both Cases, by Reason of their extreme Parvity, being perhaps Simple and Elementary Bodies, they will easily be lodged in the Pores and Interstices of the Saline Crystals; which being compos'd of the Atoms of Salt, variously by

⁽a) Trinato de Fiumi. Cap. 1: 1041 ball 2011913

Sublimation combin'd and united, are a kind of Cutting Lamelle or Blades; the Force of which could never have been very penetrating, upon the Account of their lightness and easy Dissolution, if the Mercury, without blunting their Edge, or breaking their Figure, did not lend 'em an Additional Weight, and thus at the fame Time strengthen their Action, and prevent their quick Solution by the Juices of the Stomach; which cannot now disjoin their compounding Parts, because the Vacuities into which they should in order to do this, infinuate themselves, are already possess and taken up by the Mercurial Globules

In fhort, These Crystals which are to be confidered as fo many sharp Knives or Daggers, Wounding and Stabbing the tender Coats of the Stomach, and thus caufing excessive Pains, with an Abrasion of their Natural Mucus, and (upon the constant Sense of Irritation) continual Vomitings, &c., must of Necessity, flicking here and there in the capillairy Veffels, flop the Paffage of the Blood in feveral Places, whereupon it Stagnates, and there follow little Inflammations. which growing higher and higher, terminate quickly in perfect Ulcers and Gangrenes; and these tho' fingly very small, yet ments milde?

many

many in number, do all together make up one continued and incurable Mortification.

This being the Nature of Sublim'd Mercury, it may not be amiss to enquire, how it comes to pass, That This same Compound resublim'd with live Mercury in the Proportion of Four Parts to Three, (for the Sublimate will not take up an equal quantity) especially if the Work be repeated Three or Four times, loses its Corrosiveness to that Degree as to become not only a Sase, but, in many Cases, a Noble Medicine. For I do not see that any of the Chymical Writers have hit upon the true Solution of this Phanomenon.

HERE then it is to be considered, That the Action of the Saline Crystals depending upon their Solidity and Largeness, these must necessarily, by every subsequent Subsimation, be broken into smaller and smaller Parts; the Mercurial Globules, (for the Reasons given by the Author (a) of the forementioned Theory of Fevers) arising more quickly and easily than the Salts, quit the Interstices in which they were lodged, and the Grystalline Blades are divided every time

more and more by the Force of the Fire; whereupon a new Combination of Parts fucceeds; and altho' there be a greater Proportion of the Mineral to the Salts than before, which makes Dulcify'd Mercury Specifically heavier than the Corrolive; yet the broken pieces of the Crystals uniting into little Masses of differing Figures from their former Make, those Cutting Points which were before fo tharp, are now either quite loft, or at least, by reason of their Bluntness, cannot make Wounds deep enough to be equally mischievous and deadly, and therefore do only Vellicate and Twitch the fenfileMembranes of the Stomach to that Degree, as excites 'em to an Excretion of their Contents and Glandular Juices, upwards or downwards, according as the force of Irritation is greater or lefs.

Thus a violent Poilon is mitigated into a Vomit or Purge, nay, it may eafily happen (especially in Robust Constitutions, and if the Bowels be at the same time by any means defended against the Stimulating Power of the Medicine) that this Twitching may be so slight, as to be almost insensible, and hardly troublesome; and then the Mercurial Globules being freed indeed from most of the Saline Parts in their Passage thro' the Prima Via, but still having a mixture of fame

STORY

fome few of 'em are quickly conveyed into the Blood, where by their Motion and Weight they must necessarily dissolve the Preternatural Cohasions of all the Liquors particularly of Those which Circulate in the smallest Canals, and are most Viscid and Tenacious, making them more Fluxile and Thin, or of more easy Secretion; whereupon all the Glands of the Body are, as it were fet to Work, and Scoured of their Contents: but the Salival Ones especially. being many in Number, very large and wide, and the Juice they separate of a Tough and Ropy Substance, so that a considerable Quantity of it is accumulated before it is forced out at the Orifices of the Ducts: These Effects will be most remarkable in Them, and a Salivation or Spitting must continue folong, till the Active Minerial Particles are thro' these and the other Passages discharged out of the Body.

As the Difference between Mercury Corrofive and Dulcified lies in a greater and lesser Degree of Operation and Force, so this same Consideration distinguishes the feveral Preparations of this Mineral from each other which tho' very many, yet do all vary their Effects in the Body, only according as the Mercurial Globules are diffe-

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rently

of These more or less broken by the Action of the Fire, in the Burning of Spirits upon Them, and such like Managements: And therefore however dignissed with the great Names of Arcana, Panacea, Princes Powders. &c. they do not afford us any Thing Singular and Extraordinary, beyond what we may with equal Advantage promise our selves from some or other of the most common and usual Processes.

Thus much of Mercury. Let Us in the next Place examine Arfeniek, about the Nature and Composition of which Authors are

very much puzzled.

This, in short, is either Native or Faditions, and each of three Sorts, Yellow, Red,
and White. The Native Yellow is what the
Latins called Auripigmentum; and this Olaus
Wormius (b) makes Three-fold. The Red
is the Sandaracha of the Greeks. The White
was not known to the Ancients; and indeed Theophrasius seems only to have known
the Red, but Dioscorides describes both Red
and Yellow; Nicander had no Knowledge
of either: The only Mineral Poisons Hementions are Litharge and Geruss.

ORPIMENT and Sandaracha differ only by their greater or leffer Concoction in the Earth; and therefore from Orpiment Boiled in a close Pot Five Hours in a Furnace Fire, is made the Factitious Sandaracha, as perfect as the Natural (c).

THE Facticious Yellow is made from the

Crusts of the Natural Orpiment (d).

THE Native White is more rare, but found plentifully in some Silver Mines in

Germany (e).

But the White Factitious is of the most common use of all; and it is, as Agricola tells us, no other than Orpiment again and again sublimed with an equal Part of Fossile Salt, till it is brought to a Whiteness.

ORPIMENT and Sandaracha are mostly found in Mines of Gold; and all Mettallic Writers do agree them to be the best Signs of the Richnels of the Vein. This is Ground fufficient for the Chymists to take Arsenick for the Subject Matter of their great Work, as they call It; and they have very fondly accommodated some Enigmatical Lines in

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⁽c) Agricola de Natura Fossil. p. m. 592.

⁽d) Idem, ibid.
(e) Block Scrutinium Arsenici, § XIV. the state state and

the Sibylline Oracles (f) to this Mineral. Tho' the Interpretation be ftrained, and not fairly made out, (the Author of these Verfes, whatever he might mean, being indeed Discoursing of the Name of the Divine Power it felt) yet very true it is, that this great Expectation from Arlewick is as old at least as Caligula, that is, of more ancient Date confiderably than the far greatest part of those Suppositions and Ill-contrived Compositions which do now bear the Name of Oracles: For that Covetous Emperor, as Pliny relates (g), ordered a great quantity of Orpiment to be wrought upon, that He might extract Gold out of It, and made fome; but as it usually happens in such like Attempts, the quantity did not answer the Expence. Writers do agree them to be

It is more to our purpose to take notice, that the latter Pretenders to this Philosophy, by finding their three Principles Salt, Sulphur, and Mercury in this Body,

⁽f) Lib. 5.
Εννέα γράμματ' έχω Τείρασυλλαβός είμι, νόει με.
Αί τρεῖς αι πρῶται δύο γράμματ' έ χεσιν εκάση,
Η λοιπή δὲ τὰ λοιΙὰ, κὶ εισὶν ἄθωνα τὰ πὲν ε,
Τῦ πανίὸς δ ὁριθμῦ ἐκαἰονίαδες εἰ σὶ δὶς ὁκὶω
Καὶ τρεῖς τρὶς δεκάδες.

will lead Us into its true Nature and Composition.

For whether We take Orpiment or Sandaracha, either of them will afford a Regulus or Mercurial Substance, more pure than that of Antimony. The manner of extracting It Lemery (b) has taught; and to This indeed the Mineral owes its great Ponderofity.

THE Inflammability and Smell of Arisnick are sufficient Proofs of its abounding Sulphur, which may without much difficulty

be separated from It (i).

THAT It consists of some Saline Paris we are affured by Its Solution in common Water (k); and it is upon the account of These that It does more happily promote the Flowing of Metals than any other Salt-Powders which the Workmen make use of. Wherefore fome have called It 'a coagulated Aqua Fortis. Bernald mained of 30

FROM all this it appears, that Authors do vainly Dispute wherein the Noxious quality of Arfenick refides, fince the Cafe

⁽h) Cours de Chymie, Part 1. Chap. to. 13 M ont

⁽¹²⁾ Vid. Eman. Konig. Regn. Mineral, and Boyle. Hiftory of Mineral Waters.

here is plainly much the same with that of Sublimate Corrosive; and as the Salts there together, with the Mercurial Particles, do compose pungent Crystals, so without all doubt the Regulus of this Mineral gives a like force to the Saline Bodies, which without this weight could be but of small Effect. The Main difference is, that in Arsenick we have an addition of Sulphur, which does not only strengthen the Action of the other Parts, in that as a Vinculum it keeps them united together; but consisting besides of many hot and siery Corpuscles, promotes the Inflamation of those Wounds which the Crystalline Spicula make in the Membranes of the Stomach.

Upon the Score of such a Texture and Make as this, Arfenick makes no Ebullition either with Alcalies or Acids (a), and as the Regulus of It being cleared from most of its Salts, is by much less hurtful than the crude Mineral itself; so on the other Hand, the Fastitious White, in which there is a much greater Proportion of the Saline to the Metallick Parts, is the most Violent of all the kinds, superiour in Force to Mercury Sublimate.

⁽a) Grew of Minture., pag. m. 146.

THE several Histories related by Wepfer (b) do put this out of Question; It is sufficient to our purpose to mention One.

A Dog having eat some Fat mixt with White Arsenick, died the next Day; The upper Part of the Stomach, when opened, was red and inflamed, the Coats thinner than ordinary, the bottom of It was covered with a sætid Slime, and some pieces of Fat; The Thin Guts were so Corroded as to be Previous in Three Places, Two of the Ulcers so large that they would easily admit a Bean. The Cavity of the Abdomen contain'd a yellowist loop tinged with Blood.

THE Case being thus, one would wonder what should induce Authors to prescribe so Corrosive a Mineral to be worn upon the Pit of the Stomach, as an Amulet against the Plague. This Trick we may well believe to be Dangerous, when Lionardo di Cupoa (c) tells Us of a Child kill'd by the Violent Vomiting and Purging, occasioned from a slight Wound made in the Head by a Comb wet with Oil in which Arsenick had been insused: for the Pores of the Body be-

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⁽b) Cicut. aquat. pag. 274. & legal W she di (1)

⁽g) De Peste Le unique in sin Sold son exportage (a)

ing opened by Heat and Exercise, some of the Noxious Effluvia may easily Insinuate themselves into the Part; accordingly Crato (d) observed an Ulcer of the Breast caused by this Application; Verzascha (e) Violent Pains, and fainting Fits; Diemerbrock (f), and Dr. Hodges (g), Death it self.

The truth of the Matter is, This Practice feems to owe its Origine to a (b) Mistake, some of the Arabian Physicians had commended Darsini worn in a Bag for the Preservative in Plague Time: This in their Language signifies Cinnamon; but the Latin Interpreters retaining the same word in their Translations (as was frequently done), one or other afterwards not understanding its meaning, and deceived by the likeness of the sound, substituted in its Place De Arsenico, as if Darsini were all one with Zarnich. The Authority of the first Author served to propagate the Error; nor were Those wanting who reason'd upon the Matter, and

⁽d) Epistol. 168.

⁽e) Observation 66.

⁽f) De Pefte Hift 99.8 . are the state and (f)

⁽g) De Pefte Londinent. p. 239.

⁽h) A. Deufingius de Pefte, Paat 4. Sed. 3. c. 3.

found it agreeable to their Philosophy, that this Mineral should draw to it self and concenter the Arsenical Effluvia out of the Air, and thus secure the Body from their Infection; Those being, as they Imagined the Common Cause of Pestilential Diseases.

HAVING thus particularly Discoursed of the Nature of these Two Poisons, I shall not need to insist upon any more out of the

Mineral Kingdom.

ALL of Them bear some Analogy to the former, and are more or less Dangerous, according as their Salts receive a differing Force from the Metallic Particles. For this Reason as we have observed, that the most Virulent may be mitigated by breaking the Points of the Saline Crystals; so on the other Hand, the most Innocent Minerals may become Corrosive by combining Them with Salts, as we see in the several Preparations of Silver, Antimony, Iron, &c.

Poisonous Plants.

O Proceed therefore to Vegetables, and most Notorious of These for Venomous Juices among the Ancients were Cicuta and Aconitum.

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OUR

OUR OEnanthe Cicute facie, sucso viroso, which Wepfer has described by the Name of Cicuta Aquatica, and of the difinal Effects of which in some Children who by mistake did eat of It, He has wrote a large Volume, was very probably the Cicuta fo much in use of old, especially at Athens, for Killing. At least the Violence of This makes It a much fitter Instrument of Death than the common Hemlock, which is not by far of fo. Malignant a Quality.

Tho' we must withal allow differ in Climates very confiderably to highten or abate the Virtues of Plants. And it is not altogether Improbable, that the Poison with which the Athenians took away the Lives of Malefactors was an inspissated Juice, compounded of That of Cicuta and other Corro-

five Herbs (i).

SUR

But be this as it will; The alterations which Wepfer observed the Roots of OEnan. the to make in the Body, were, a violent Pain and Heat in the Stomach, Terrible Convulsions with loft of all the Senses, Diffortion of the Eyes, and flowing of Blood out at the Ears, The Mouth for fall that most Notorious of These for Veno-

mous Juices among the Ancients wer and Aspailum, I A (i) Vid. Wepfer, Pag. 60.

that no Art could open It, Efforts to Vomit, but nothing thrown up, frequent Hic-Coughs, with a great Distension and Swelling, especially at the Pit of the Stomach; and when Death had concluded the Tragedy, a continued Running of Green Froth at the Mouth.

Stalpart van der Wiel gives us the like Account of Two Persons killed at the Hague

by the same Roots (k).

In a Dog, who for Experiment's fake died by this Poison, The Stomach when opened was found quite Constringed, and Shut up at both Orifices, its inward Surface red, with livid Spots here and there; the Intestines were empty; only the Rectum contained a little greenish Mucus.

Thus it appears, That this Plant confifts of Hot, Acrious and Corrofive Parts, which by Rarefying the Juices of the Stomach, and Wounding its Nervous Membrane, are the Cause of all those Disorders which do imme-

diately follow.

For upon the Sense of a violent britation and Pain, the Fluid of the Nerves is prefently in large Quantities determined to the Part affected; and this, if the Stimulus

ont to another bemutravo bus b'isossi et

be not over great, will be only to such a Desgree as is sufficient, by contracting the Figures of the Stomach, and Muscles of the Abdomen, to throw off the Cause of the Disagreeable Sensation; but the uneasy Twitching being too terrible to be borne, the Minds by a kind of Surprize, does with Haste and Fury as it were Command the Spirits thither; Thus the Business is overdone, and the Action of the Fibres becomes so strong, that the Orifices of the Stomach are quite closed; so that instead of discharging the Noxious Matter, the Torment is made greater, and the whole OEconomy put into Consussion.

This forcible Contraction of the Muscles was the Reason that one of the Children which Wepfer saw, made Urine in the midst of the Agony, to the height of Five or Six Foot, with a strength and violence Sur-

prizing to the Spectators.

Nor is it any wonder, if in these Ciricumstances all Sense be lost, Blood gush out at the Ears, Nostrils, &c. the Parts being all torn and broke by the Violence of the Concultions; which the they began in the Muscles of the Belly, must at last prevail in the Members too, till the whole Fabrick is shock'd and overturned; and some of the Core

Corrofive Salts perhaps getting into the Blood, and by the Rarefraction of It Diftending the Vessels, The Membranous Coats of which being already overstretched, will the more easily give way, and let out their Fluid.

THE Case of Aconitum is much the fame. this is our Napellus or Monksbood; and its Effects do so nearly agree with those now related of OEnanthe, that I shall not need to recite Them, the Experiments of (a) Wepfer are full and convincing. And indeed as all the Histories which this fame Author has fo carefully given Us of Trials made with several Vegetable Poisons, Solanum, Num Vomica Cocculus Indicus, &cc. on different Creatures, do put it out of all doubt, that the common Mischief of These is a Twitch ing and Inflammation of the Stomach; for it appears from hence, that Virulant Plants, altho' they may be diftinguished even from one another by particular Virtues, do however Kill by a like Operation and Force. which differs chiefly in Degree from that of Nozions Minerals. of instance, protectly to induce I sometime

And therefore in order to know what the Specifick Qualities of any such Herbs are, they must be given only in very small Doses and then perhaps it would appear, that they are not made (as some do imagine) to be deleterious and destructive, but for very Good and Beneficial Uses; as we do particularly Experience in the Case of Opium.

Non is it at all strange, that the Symptoms from a Vegetable, and from a Mineral Virulency, should be so different, altho' of the same kind, and only of unequal force; for the more solid Parts of Minerals, eroding the Coats of the Stomach, induce a perfect Mortification and Gangrene; and thus do their Work at once; whereas the weaker Salts of Plants can make but a slighter Exceptation, upon the painful Sense of which those Agonies and Convulsions that sollowed or the gradually exhaust the Strength, and thus the Animal is not kill'd so speedily, nor with the same Appearances.

Upon this Score tho' Mineral Poisons do not pass the Prima Via, Vegetables ones in some Cases possibly may; just as we find Those Medicines which have a great Degree of irritation presently to induce a Vomiting; whereas the same Twitching a little weaken-

ed suffers them to pass into the Intestins, and
Work downwards by Stools.

By this we may perhaps give some Guess at the Nature of those Poisons, with which they tell us the Natives in some Parts of Africa and India are so expert at Killing, that they can do It in a longer or shorter time as they please. These are most probably either the Fruits, or the Inspissated Juices of Corrosive Plants, which inslaming the Bowels, may cause little Ulcers there, whose Fatal Consequences, we know, may

very well be flow and lingering.

This I am the rather induced to believe, because an Ingenious Surgeon, who liv'd in Guinea, told Me, that the Antidote by which the Negroes would sometimes Cure those who were poisoned, was the Leaf of an Herb, which purged both upwards and downwards. For by this means the Stomach might be cleared from the adhering Corrosive Parts of the Venom. Yet I can hardly think it possible at the same time that they should be able by varying the Composition or Quantity of the Dose, to ascertain the Time in which It shall Kill, to a Week, Month, &c. nor indeed have I ever met with any Person who could attest this to be Matter of Fact.

Tho' repeated Trials and Observations may help one well practifed in such Trick to give notable Conjectures in this Point.

The Ancients indeed pretended much the same thing with their Aconitum, of which They seem to have made a kind of Secret and Mystery; as we learn from Theophra-stus (a) who says The ordering of this Poifon was different, according as it was designed to Kill in Two, Three Months, or a Year: But this he relates only as a common Tale of Opinion, and not as a Story to which Himself gave any manner of Credit.

It is very plain, that the common Cura of all Poisons of this kind, must be by freeing the Stomach as foon as possible from the Corrosive Vellicating Particles, and defending the Membranes from their Acrimony, by such Things as are of a Smooth, Oily and Lubricating Substance.

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OPIUM.

The Ancients having Experienced that Opium would offentimes Kill, the taken in no large quantity, ranked It with Poisons, and gave it the first Place among Those, which from their Stupisying Quality They call'd Narcotic.

TRUE indeed it is that We do every Day find This to be, in a small Dose, one of the most Noble Remedies in the World. But it is not worth the while to engage in the Controversy warmly debated by some Authors, how far Poisons are Medicinal; since it is notorious enough, that Medicines do sometimes prove Poisonous. And take the Matter as We please, it may serve to very good.

good Purposes to understand the manner of Operation of so Celebrated a Drug, and help Us in a great Measure to ascertain its Use in different Cases, if we are beforehand rightly apprized of Its Nature and Way of

Acting

In order hereunto, it is necessary, besides some other Pracognita, since one of the chief Virtues of this Medicine is Hypnotic, to Define distinctly what Sleep is, or rather (to avoid Consuson and Disputes about Words) what difference there is between an Animal Bodywhen asleep and when awake. For I suppose the History, Manner of Preparing, &c. of Opium to be already sufficiently known.

First then, There is no One but knows that in Sleep there is a Cellation from Action When Waking we Walk, Discourse, Move this or that Limb, &c. but in natural and undisturbed Rest there is nothing of all these that is, whereas being awake, we do perform several Motions by the voluntary Contraction of our Muscles; when asleep, those Muscles only are Contracted whose Action is in a manner Involuntary, or to which the Mind has always so constantly determined the Spirits, that it does it by a Hahit, without the Intervention of the Reasoning Faculty;

culty; fuch are Those of the Heart and Breast.

So that there is at this time a kind of Relaxation or Looleness of the moving Fibres of the several Members; or at least such a quiet Position and State of them, by which all the Antagonist Muscles are in an Aquilibrium and Equality of Action, not overpowering one another. For this indeed seems to be one great Design of Sleep, to recover to the Parts overstretched by Labour their former Tone and Force; and therefore we do naturally, when composing our selves to Rest, put our Body into that Posture which does most favour the particularly wearied Limbs, and conduce to this end.

In the next place, it is very plain that where is in Sleep not only a Rest and Suspension from Acting of most of our Bodily Organs, but even of our Thinking Faculty too. That is (for I would prevent Cavils) a ceasing from such Thoughts, as when waking We are exercised about, which we do Restest upon, and Will to imploy our Mind with. For the Dreams are Thoughts, yet they are but imperfect and incoherent Ones, and are indeed either so faint and Languic Representations, as to be consistent with our Sleep, as some may be; or else if they be strong and lively, they are, as every one knows

knows, the Interruption and Diffurbance of It.

FROM hence It will follow, that the Motion of the Arterial Fluid must be, Ceteris Paribus, more sedate, even and regular, in the time of Sleeping than Waking; For, besides the various Alterations which in the latter State this receives from the several Passions of the Mind, the very Contractions of the Muscles themselves in Exercises of the Body do differently forward its Course; whereas in Sleep the force of the Heart and Pectoral Muscles being more constant and uniform, gives it a more calm and equally

continued Impulse.

Hence also it will come to pass, that the Influx of the Liquor of the Nerves into the Organs of the Body, as also its Reflux towards the Brain, is in Sleep either none, or very inconsiderable; that is, that this Fluid has at this time but little or no Motion, For its Muscular Assion and Sensation that require It to be thus determined, this way or that which are now hardly any. And yet by the arrival of the Blood at the Brain, this Juice will still be separated there, fit to be derived into its Canals or Tubes. So that by this means there will be a kind of Accumulation, or laying up in Store, of Spirits for the Offices and Requirements of Waking.

Thus

knows

Thus We may in fhort look upon the Time of Watching, as the Time of Wearing out, or the Destruction of the Animal Fabrick and the Time of Sleep, as that in which it is repaired and recruited; not only upon the Account of what we have just mentioned concerning the Nervous Liquor, but alfo with respect to all the other Parts as well Fluid as Solid. For Adion does necessarily by Degrees impair the Springs and Organs; and in Motion something is continually abraded and ftruck off from the Diffractile Fibres, which cannot otherwise be restored than by their being at rest from Tenfion. Befides that, fuch a regular and fleady Courfe of the Blood, as we have observed to be in Sleep, is by far more fit and proper for Nutrition, or an Apposition of Parts to the which an uneven Hurry of It is more apt to tear off and wash away.

THE Case being thus, it is very plain that whatsoever can induce such a Disposition of the Fluids and Muscular Parts of the Body, as this we have described, will so far cause Sleepiness. And in like manner, when any thing interposes and hinders this Composedness and Tranquility, the removing of the Impediment will be the causing of Sleep, inasmuch as this is only reducing the Animal OEconomy to its right State, in which by na-

tural Order there must be a Suc. ession of Sleeping and Waking. as property location

Thus it appears how necessarily continued Exercises do make Us Sleepy, since These do exhauft the Juice of the Nerves; that is both lessen its Influx into the Organs of Motion, and incline the Mind not to determine it any longer that way, upon the account of the Pain and Uneafiness, with which too violent a Tension of the Parts is always astended; which therefore we must needs defire to Relax, or lay to Reft. with home haberd

energy THAT Sleepiness which follow upon a fulness of the Stomach after Eating or Drinking, is owing to a different Cause, and does indeed so nearly fall in with the Effects of Opiate Medicines, that it requires a particu-

lar Confideration.

As Hunger, or the Emptinels of the Stomach, is a painful Sensation; so the satisfying or removing of This is a pleafing or agreeable One. Now all Pain is a Stimulis upon the Part affected; and This, we all know, being attended with Contractions of the pained Membranes, causes a greater Atflux than ordinary of the Nervous Juice that way. On the other Hand, Pleasure, or a delightful Sensation in any part, is accompanied with a fmooth Undulation, and eafy Reflux of the Liquor of the Nerves towards the lamp:

the Brain. This is as it were the Emertainment of the Mind, with which being Taken up, it does not Determine the Spirits to the Organs of Motion; That is, there is fuch a Relaxation of the Muscular Fibres, and fuch a Disposition of the Nervous Fluid, as we have observed to be necessary to Sleep.

THIS is the Reason of that Chillings in. the Limbs, which we commonly Complain of after a good Feaft. Stone Stone . source

If it feem strange that a Pleasure in the Stomach should so powerfully Influence the Mind; let it be considered, on the other Hand, how violent Effects, an uneasy and disagreeable Sense in the same Part does produce; what a terrible Agony Two or Three Grains of Grocus Metallorum throws the whole Fabrick into; how readily the Fluid of the Nerves is with a more than ordinary Impetus determin'd and commanded into the Muscles of the Stomach and Abdomen, in order to throw off the Enemy, and remove the ungrateful Sensation.

Now the Confequences which we have ascribed to a pleasing Sense in that Part are only just the contrary of these we find the opposite Affection of Pain induces. And indeed Pleasure and Pain are Two great Springs of Action in the Animal Œconomy The Changes they make in the Fabrick are

K 3

the Causes of many Effects which feem furprizing, because we do not regard the Mechanism by which they are produced : But these must be more considerable in the Stomuch than any where elfe; This Part being, for very wife Purposes, of so acute a Feeling, that some Philosophers have for this Reason

thought it to be the Seat of the Soul.

BESTDES this Confideration. We must take notice, that the Stomach being distended with Food, preffes upon the descending Trunk of the Aorta, and thus causes a greater Fulnels of the Veffels in the upper Parts; whereupon the Brain is loaded, or the Derivation of Spirits in the Nerves diminished. and Unattivity and Drowfiness infues. From hence proceed Those Flushings in the Face. Rednefs, &c. after plentiful Eating or Drinking, most Visible in those whose Vessels are Lax and Weak, as in Exhaufted and Heftick Persons they more especially are.

THUS we may, without the Athfrance of the New Chyle entring into the Veffels, ac. count for that Inclination to Sleep which follows upon a full Stomach. Tho we must alle allow the Diftention from This to be a: confiderable Caule of the same Effects; But this does not happen immediately, nay, fometimes perhaps not within Two or Three Hours after Lating and therefore the fud

den Drowliness must (as well as the present Refreshment and Reviving which Meat gives) be chiefly owing to fome more speedy Alteration.

We come then in the next Place to Opium it felf: The Chymical Analysis of (a) which does out of one Pound afford of a Volatile Spirit of the like Nature with that drawn from Harts-Horn, Five Ounces and Five Drachms; of a fætid Oik One Ounce Two Drachms and a half; of Gaput Mortuum, fmelling like Spirits of Harts-Horn, Seven Ounces and Six Drachms. The month accessors

THE Virtues therefore of Opium are owing to a volatile Alcaline Salt, intimately mixt and cumbin'd with an oily fulphurous Substance. The Effects of which we must confider, first of all upon the Stomach, and afterwards when they have passed the Prima Via, upon the Arterial Fluid it felf.

An agreeable Sensation produced in the Stomach, together with a Diffension of its Membranes, we observed before to be the Cause of that Sleepinels to which we are so prone after Eating. The One of These ingages the Mind, the Other acts upon the Body. For Pleafure amufes the Soul, as of Volatile Parts, whole Activity is tempered

⁽a) Vid. Pitcarn. de Circlatione Sanguinis in ani-Rarefying K 4

it were, so that it does not Think, or exercise it self about any outward Objects; that is, Is inclined to Rest. And the Fulness of the Vessels in the Brain, Checks and Hinders, in some Measure, the Derivation of the

Nervous Juices into the Organs, &c.

Now, They who take a moderate Dose of Opium, especially not long accustomed to It, are so transported with the pleasing Senses it induces, that They are, as they oftentimes express themselves in Heaven; and the They do not always Sleep, (which proceeds from the Presentation of pleasing Images to the Mind, being so strong, that like Dreams they do over-ingage the Fancy, and so interrupt the State of Rest) yet they do however enjoy so perfect an Indolence and Quiet, that no Happiness in the World can surpass the Charms of this agreeable Extess.

in a far more eminent Degree, all those Effects which we observed to follow upon that grateful Sense in the Stomach which a moderate Fulness produces. For no Bodies are so fit and able pleasingly to affect our sensible Membranes, as those which consist of Volatile Parts, whose Activity is tempered and allay'd by the Smoothness of some Lubricating and Oily ones, which by lightly Rarefying

Rarefying the Juices of the Stomach, and caufing a pleafant Titillation of Its Nervous Coat, will induce an agreeable Plenitude, and entertain the Mind with Ideas of Satiffaction and Delight.

THE Case being thus, We easily see upon what Mechanism the other Virtues of Opium do depend, Its Eafing Pains, Checking Evacuations, &c. not only in that the Mind being taken up with a pleafing Senfe, is diverted from a difagreeable One; But all Pain being attended with a Contraction of the Part, that Relaxation of the Fibres which is now caufed, eludes and deftroys the Force of the Stimulus.

In like Manner in immoderate Secretions there is most commonly an Irritation of the Organs, the Removal of which will abate the Discharge. And herein lies the Incrassatting Quality of this Medicine, in that the Twitching Sense upon the Membranes of the Lungs, Bowels, &c. being now lessened, the sharp Humour is suffered to lodge there in a greater quantity before it is fo troublefome as to be thrown off and expell'd; it being all one, as if there were no Irritation of the Part, if the uneafy Sense thereof be not regarded by the Mind.

THESE Effects will all be heightned by the Mixture of the Opiate Particles with the Tipplers

Blood :

Blood, which is hereupon Rarefied, and Distends its Vessels, especially those of the Brain; and thus does still to a greater Degree lessen the Instur, of the Nervous Fluid to the Parts, by pressing upon the little Tubuli, or Canals, thro' which it is derived.

This is the Reason of that Defficulty of Breathing, which They do for a time Experience who take these kind of Medicines; This Symptom being interparable from the Rarefaction of the Blood in their Lungs.

FROM hence it appears, that the action of Opium is very Analogous to that of other Volatile Spirits, only that a small Portion of It has a force equal to that of a greater Quantity of most of Them.

This is very evident in Those who accussion Themselves to take large Doses of It; as the Turks and Persians do to that Degree, that it is no uncommon thing there to Eat a Drachm or Two at a time; for the Effects of It in Them are no other than downright Drunkenness; upon which account (b) it is as common a Saying with Them, and on the same Occasion, He has eat Opium; as with Us, He has drank too much Wine.

NEITHER indeed do They otherwise bear such large quantities of It, than our

⁽b) Vid. Belon. Voyage, 116. 3. c. 15.

Tipplers will a great deal of Brandy, that who list is, by habituating themselves to It by De-bear grees, beginning with fmall Dofes, and re-onium quiring fill more and more to raise themfelves to the fame Pitch. Just as (c) Galen. tells Us of a Woman at Athens, who by a gradual Use had brought herself to Take without any hurt, a confiderable quantity of Cicula or Hemlock. Which Instance is the more to our Purpole, because Nic. Fontanus (d) knew one who being Recovered of the Plague and wanting Sleep, did, with very good Effect, eat Hemlock for fome time, till falling Ill again of a Fever, and having left off the Use of this Remedy, He endeavoured to procure Rest by repeated Dofes of Opium, which (Nature having been accustomed to a stronger Alterative) had no Operation, till the help of Cicuta was again call'd in with defired Success.

It is a sufficient Confirmation of all this Reasoning, that Prosper Alpinus (e) observed among the Egyptians, those who had been accustom'd to Opium, and were faint and Languid thro' want of It, (as Drinkers

MANAGER AND A STREET OF THE ST

o (c) Simple Medicam. Facult. I gardi 80 abom ad

⁽d) Respons & Curat. Medic. 7.162. admin and

⁽c) Medicin. Egypt, A 4 6do or danona encivido

are if they have not their Spirit) to be recovered, and put into the same State of Indolence and Pleasure, by large Doses of Cretic Wine made hotter by the Insusion of Pepper, and the like strong Aromaticks.

Non is it perhaps amils to remark, that in Maniacal People as is frequently observ'd, a Quadruple Dose of Opium will scarce produce any confiderable Effect : Now in Perfons fo affected, the Mind is deeply ingaged and taken up with some Images or other, as, Love, Anger, &c. fo that it is not to be fo eafily moved or diverted by those pleasing Representation which it would attend to at another Time, and upon which the Virtues of this Medicine do in a great Measure depend. Besides this, those who are Maniacal do to a wonder hear the Injuries of Cold, Hunger, &c. and have a prodigious Degree of Muscular Force, which argues the Texture of their Blood to be very ftrong, and the Cohefion of its Globules great; fo that the spiritous

Many are the Improvements which might be made of this Theory, with Relation to the Practice of Physick; but these will be obvious enough to one instructed in the Animal OEconomy.

Parts of the Opiate cannot make that Difjunction and Rarefaction of this Fluid in them, which it does in ordinary Bodies and

Constitutions.

prople bear To conclude then as to the Subject in hand it is very plain that there needs no more to make Opium prove destructive or a Poison, than to take too great a Quantity of it; for then it must inflame the Stomach, and rarefy the Blood to such a Degree, that the Vessels cannot again recover their Tone, whereupon Apoplectic Symptoms, &c. will insue.

To be convinced of this, I forced into the Stomach of a small Dog about half a Drachm of Crude Opium diffolved in Boiling Water. He quickly Vomited it up with a great Quantity of Frothy Spittle, but repeating the Trial, by holding up his Head. and beating him, I made him retain Three or Four Doles, intermitting between each about a Quarter of an Hour; when he had thus taken, as Pould guels, near Two Drachms, I watch'd him about an Hour, then he began to Sleep, but prefently flarted up with Convulfions, fell into univerfal Tremblings, his Head constantly twitched and shaking, he breathed fhort and with Labour, loft intirely the Use first of his hinder Legs, and then of the Fore ones, which were friff and rigid like Sticks. As he lay Snorting, to haften his End, I was giving him more of the Solution, but on a sudden his Limbs grew limber, and he Died.

cure

OPENING his Stomach, I found it wonderfully diftended, tho' empty of every thing but some Water and Opium: Parcels of Frothy Mucus swimming in it; the Inside was as clean as if scraped and washed from all the Slime of the Glands, with fome Redness here and there, as in a beginning Inflammation. The Pilorus was contracted. The Blood Vessels of the Brain were very full; and I took out a large Grume of Concrete Blood from the Upper Part of it, cutting into the Sinus Longitudinalis, as is not uncommon in Apoplectic Carcaffes, but found no extravalated Serum in the Ventricles, nor among

any of the Membranes.

As to the Cure of fuch Cale; besides other Evacuations, Acid Medicines and Lixivial Salts must certainly do Service; thefe by their Diuretic force caufing a Depletion of the Veffels. This is the Foundation upon which Starky compounded his Pacific Pill. Generous Wine which the Ancients gave for an Antidote, can be no other ways useful than as it diffolves the Refinous Clammy Part of the Opium flicking to the Coats of the Stomach, and fo forwards its Expulsion by other Helps, which cause a contraction of the Muscular Fibres.

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ESSAY the Fifth.

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is most certain; but to Argue from hence, that Headly Thours I Malkmant a owner Headly Alicares to the only A too B.

Poisonous Airs, and Waters

B Estors these already treated of, there is yet another way of being Poisoned, and that is by Venomous Steams and Expandations, or a Poisonous Air taken into the Body by the Breath.

This is notorious enough, and Authors do upon many Occasions make mention of it; but when they come to explain the particular Manner how this kills they most commonly

which prove destructive by being admitted into the Stomach, alledging that Malignant Fumes and Airs are therefore fatal, because impregnated with Arsenical Mercurial, and the like Deleterious Midapara or Particles, they do convey these into the Blood; which being of a very Corrosive Nature, must necessarily do hurt both to the Fluid and Solid Parts.

And indeed that the Furnes of these same Minerals are very pernicious, and are fill'd with their Atoms very unfit for Respiration, is most certain; but to Argue from hence, that all deadly Vapours and Malignant Airs owe their Mischief to these only, is too fond and ill-grounded a Conceit; since upon a due Enquiry it will appear, that there may be, and are, Mortiserious Exhalations from the Earth, insecting the Air, of a Nature so different from any of those Poilons, that the very Substance from which they arise may not be at all hurtful, the taken into the Stomach it self.

Venomous Steams and Dompstrom the Earth the Latins in one Word call'd Mephites (a).

⁽a) Virgil. En. 7. v. 84.

Szvama ; exhalat opaca Mepcitim. Wall.

Vid. Servium. ibid.

This, as many other Tuscan Words, comes from a Syriac Theme which signifies to blow or breathe (b).

AND in ancient Times several Places were notorious for em; so the Mephitis of Hierapolis was very Famous, of which Cicera Galen, but more particularly, and from his own Sight and Knowledge, Straba (c) makes meation.

Such another was the Specus Corycius in Cilicia, which upon the Account of its stinking deadly Air, such as is thought to proceed from the Mouth of Dragons, which the Pores give to Typhon, was call'd Cubile Typhonis. This Pompon. Mela (d) describes; and it is indeed as ancient as Homer, (e); for Arima, in which he places it, was, as Disdimus says, a Mountain of Cylicia.

NEITHER are such Fumes as these infrequent Now-a-days; and the mostly taken notice of in Mines, Pits, and other Subterraneous Places, yet they are sometimes met within the Surface of the Earth too, especially in Countries fruitful of Minerals, or pregnant with Imbowelled Fires, such are

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day and within temps

⁽b) Scaliger. Conject. in Varron.

⁽c) Lib. 13.

⁽d) De Situ Orb. L 1.c. 13.

⁽e) En apipois 891 pari Tupicos (supras surais II. B. v. 783.

Hungary and Italy, which latter (as Scneca (f) observes) has always been more than any other remarkable for 'em.

I shall therefore, having had the Opportunity of making some Remarks upon One, the most Famous of all in these Parts, give as good an Account as I can of That, and its manner of Killing; which the I dare not affirm to be universally applicable to any Mephitis whatsoever, yet seems plainly to be the Case of most of em; and where it is not, this simple Mischief will only be found to be complicated with another, and then some extraordinary Symptoms or Appearances in the Animals kill'd, will easily make a Discovery of the Additional Venom and Malignity.

This Celebrated Mofeta, taken notice of, (or at least some other hereabouts) even in the Time of Pliny (g), is about Two Miles distant from Naples, just by the Lago d'Agnano, in the way to Pozzoli or Putcoli, and is commonly call'd la Grotti de Cani, because the Experiment of its deadly Nature is frequently made upon Dogs; tho it be ascertainly satal to any other Animal, if it come within the Reach of its Vapour; for

Lauren will (b)

⁽f) Nat. Quæft. 1. 6. c. 28.

Charles the Eighth of France proved it In upon an A/s; and two Slaves put into it by Order of D. Pietro di Toledo, Viceroy of Napples, with their Heads held down to the Earth, were both killed (b).

"Tis a small Grotta at the Foot of a little Hill, about Eight Foot high. Twelve long and Six broad; from the Ground arife a thin, fubtile, warm Fume, visible enough to a discerning Eye, which does not spring up in little Parcels here and there, but is one continued Steam, covering the whole Surface of the bottom of the Cave; and has this remarkable Difference from common Vapours, that it does not, like Smoak, diff perfe itself into the Air, but quickly after its rife falls back again, and returns to the Earth: the Colour of the Sides of the Grotta being the Measure of its Afcent, for fo far it is of a darkish Green, but higher, only common Earth, and this is about Ten Inches And therefore as myfelf found no Inconvenience by standing in it, so no Animal if its Head be kept above this Mark, is in the leaft injured: But when (as a manner is) a Dog, or any other Creature, is forcible held below it, or by reason of its smallness can't hold its Head above it, It prefently, like one flunn'd, the Tenemone Completes would certain be

⁽h) L. di Capoa delle Moset. pag. 37.

loses all motion, falls down as Dead, or in a Swoon, the Limbs convuls'd and trembling, till at last no more sign of Life appears than a very weakand almost Insensible beating of the Heart and Arteries, which if the Animal be lest there a little longer, quickly ceases too, and then the Case is irrecoverable; But if snatch'd out, and laid in the open Air, soon comes to Life again, and sooner if thrown into the adjacent Lake.

In this short, but accurate, History of the Grotta de Gani, I have set down those Particulars which do not only distinguish Mephicial Exhalations from common and innocent Fumes, butalfogive Hints sufficient, I think, Mechanical to determine the Reavison and Manner of their surprising Effects.

AND not to spend time in resulting the Opinions of Others, I shall only take Notice, that here can be no suspicion of any true Venom or real Poison; if there was, it were impossible that Animals taken out of the Grotta, should so immediately recover the Effects of it, without any remaining appearance of Faintness and Sickness, or such like Symptoms as those suffer who have been breathing in an Air impregnated with malignant corrosive Effectia. Besides, that the Venomous Corpuscles would certainly, in some Degree at least, infect the Air in the

the upper Part of the Cave, which continues pure, and fit for Respiration. Neither indeed after what manner soever this Poison be imagined to Act, whether by dissolving or coagulating the Blood, could its Efficacy be so sudden and momentaneous, without some Marks of it in the Creatures killed, when opened, which yet do discover nothing of this Nature extraordinary, neither in the Fluid, nor in the Solid Parts.

In order therefore to understand where in this deadly quality Consists; I say in the first Place, that Lite, so far as it respects the Body, is, in one Word, the Circulation of the Blood; that is; its motion in Conical Distractile Vessels from the Heart to the Extreme Parts, and its Return to the Heart again by the same Canals inverted; For, its upon this that all Animal Functions, all Sense and Motion, Voluntary and Involuntary, do depend; so that the regularity of this Course is the Measure of Health, or the most perfect Life, as its Various Irregularities are the Occasions of Sickness and Diseases, or a beginning Death.

Now all the Animal Operations and Offices which proceed from this Circulation, are the Effects of leveral Secretions of Liver quors of very different Natures out of the same Fluid Mass, it was therefore absorbed

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lutely necessary that the Blood before It be distributed to the Organs should be so comminuted and broken, as that no Cohesion of its Parts should hinder the Separation of these Juices from It, when it Arrives with a determinate Force at the Orifices of the Secretory Vessels.

This Work is done in Its Passage thro's the Lungs, by the repeated Compression of the Air in those Bladders upon the Arteries, with wonderful Contrivance dispers'd among em (a). Herein lies the Use and Necessity of Respiration; and the sudden Mischief of Stopping it, in that the whole Mass of Blood being to pass this way, upon a Check here there presently insues a Stagnation, that is a Cessation of all Animal Functions, or Death; Which will be the more speedy, if not only no Air is inspired, but a Fluid of a quite different Nature from It succeeds in its Place.

WHEREFORE it must be observed, that this good Effect of the Air is performed by its Elasticity; and that no Fluid whatsoever, that we know, besides its Elastic, at least to any considerable Degree, that is, has a Faculty of expanding and dilating it self when compressed; No, not Water, as near as That is thought to appreach to Air in its Nature.

(a) Vid. Malpigh de Pulmon.

AND now as to the present Cafe, I took notice before that this Vapour is one continued and uninterrupted Steam, and that quickly after Its rife it falls down again; that is, that it has little or no mixture of Air with It, or no Elasticity; and is, on the other Hand very heavy, when forfaken by the Force of Heat that drove it upwards.

So that I make no Question, but that Animals in this Place do inflead of Air in-Spire Mineral Fumes, that is, a thin watery Vapour, impregnated with fuch Particles as do, when united together, compole folid and heavy Masses; which is so far from helping the Course of the Blood thro' the Lungs, that it rather expels the Air out of the Velicula, and straitens the Passage of the Blood Vessels, by its too great Gravity; whereupon the Bladders are relaxed and fubfide, and the Circulation is immediately Interrupted. But if the Animal be in time removed out of this Steam, that finall Portion of Air which does after every Exspiration remain in the Veficula. may be powerful enough to drive out this Noxious Fluid, especially if the Head of the Creature be held downwards, that fo its Gravity may forward its Expulsion; or It be thrown into Water, which by affifting, upon the account of its Coldness, the Contraction of the Fibres, promotes the retarded Circle

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of the Blood; as we every Day experience in a Deliquium Animi, or Swooning Fit.

THO if this Stagnation be continued too long, no Art can renew Life, no more than in One perfectly firangled, nor will the Lake of Agnano it felf be of any Service, which thews that there is no fingular Virtue in That Water beyond any other; nor is it, as fome have fondly Imagined, a Peculiar Antidote to the Poison of the Grotta.

THE bad Effects of fuch Fumes as This will be themore certain, because the Inspired Mineral Particles twitch and irritate the Membranes, which are hereupon contracted to that Degree, as not to be able to recover their Tone, and so the Force and Action of

the Lungs is quite loft.

IT appears from all This not to be at all necessary to make any farther Enquiry into the Particular Nature of these Mineral Particles, fince they do in this Case act chiefly by their Gravity, which is common to 'em all. Tho' indeed the Greenish Colour of the Earth, together with its Subacid Taste, very much (as L. de Capoa observes) like to that of the Pblegm of Vitriol, feem to declare them, if not altogether yet principally at leaft, to be Vitriolick.

To conclude this Part of our Discourse; I think it a sufficient Confirmation of this Reasoning

Reasoning, that in Frogs kill'd in this Grotta, the Bludders of the Lungs (more visibly otherwife and diffinct in these Creatures berhaps than in any other) were found subfided, and quite Empty of Air (b). But if any one defires a tarther Proof, he may, according to thele Principles, make (as Lionardo di Copoa (c) did) an Artificial Mephitis; for if Antimony, Bifmuth, or any other fach Mineral be finely powdered, and moistened with Aqua Fortis, or Spirits of Nitre, there will arife a great Heat, and a thick dark Smoak. in which, as in the Grotta de' Cani. Torches are extinguish'd, and Animals, tho but flowly, flifled and Killed. And this Effect will be more fenfible, and equal to the most Violent Mephitis, if the Antimony or Markaste be mix'd with Bitumen, and the Spirit of Nitre or Aqua Fortis, intirely depurated from all its Phleem.

AND thus I have shewn how Death may enter at the Nostrils, tho' nothing properly Venomous be inspired. It were perhaps no difficult Matter to make it appear, how a lesser Degree of this Mischief may produce Effects, tho' seemingly very different from these now mention'd, yet in reality of the

⁽b) Vid. L.di Capoa Milet. pag. 40.

⁽c) Page 128.

fame Pernicious Nature: I mean, how fuch an Alteration of the common Air as renders it in a manner Mephitical, that is, increases its Gravity, and lessens its Elasticity, (which is done by too much Hear, and at the fame time too great a Proportion of watery and other groffer Particles mixt with it) may be the Caufe of Epidemick Diseases, and it may be more especially of those, which by Reason of their untoward Symptoms, are usually call'd Malignant.

For it is very Remarkable, that Hippoerates (a) observed the Conflituion of the Air, which preceeded Peftilential Fevers, to be great Hears, attended with much Rain and Southern Winds, and Galen (b) takes Notice, that no other than a moist and bot Temperament of the Air brings the Plague it felf; and that the Duration of this Conflitution is the Measure of the Violence of the Pestilence. Lucretious (c) is of the same Mind; for in his admirable Description of the Plague of Athens, Thefe Difeafes, fays He, either come from the Air or arise from the Earth.

⁽a) Epidem. l. 2. Es 3. (b) De Temperament. l. 1. c. 4. & Commentar. in Epidem. l. 3. (c) L. 6. v. 1098.

—Ubi Putrorem humida nacta est Intempestivis Pluviisq; & Solibus icta.

In short, the general Histories of Epidemick Distempers do almost constantly confirm thus much, and would have done it more, if the vain Notion of Occult Venoms had not preposses'd the Minds of Authors, and made Them regardless of the manifest Causes.

AND This is notorious enough in those Countries where Malignant Diseases are most rife; Thus it is a very common Observation in the East Indies, that during the dry Heats the Season is Healthful, but when the Rains fall immediately upon the Hot Weather, then untoward Fevers begin to threaten.

THE same is observed in Africa; for (as Joan. Leo (d) relates) if Showers fall there during the Sultry Heats of July and August, the Plague and Pestilential Fevers insue thereupon, with which whatsover is infected hardly escapes.

AND here I might, by reflecting on the Use and Necessity of Respiration, and the particular Manner of performing It, (of which I have hinted something already) and considering withal the true Nature of Fevers, easily shew how such a Constitution of the

⁽d) Histor. Afric. L. 1. c. 1. Vid. Purchas Pilgrims.

Air, as this is, must necessarily produce such Effect; might run over the Propolitions of Bellini; which as they do plainly evince Malignant and Peftilential Fevers to be owing to a viscid and tenacious Lentor or Slime, which at first obstructs the Capillary Arteties, and afterwards being disfolved by Heat Ferments with the Blood, and changes it into a Mass unequally Fluid and Glutinous, and therefore unfit for all the Operations of the Animal Œconomy; fo it would be no uneasy Task to prove, that Air at the same time Hot and Moift, being less able to comminute and break the Arterial Fluid in the Lungs than is necessary, in order to prepare it for Secretions, it is no wonder, if when the Blood paffing through the capillary Veffels arrives at the Secretory Organs, the Cohæsion of its Parts not being sufficiently removed, instead of deriving several Juices out of it into the Glands, it leaves its most Glutinous and Viscid Parts sticking about the Orifices of the Vessels; which tho' they may at first be wash'd away by the repeated Impulses of the succeeding Blood, yet the Caufe continuing, and thefe Strokes growing still Weaker and Weaker, (from a lesser Quantity of Spirits being separated, and hence a more languid Contraction of the Heart) these Obstructions are increas'd to that

that Degree as not to be remov'd, till by the Violent Agitation of a greater Heat, this Slimy Mucus is thrown into the Blood again, and there in the Nature of a Ferment so disfurbs its Mixture, and changes its Compages, as to make it a Fluid of quite different Properties, that is, altogether unfit for the same Functions or Offices.

The Effect will be the more certain, because a damp Air upon the Surface of the Body checks insensible Perspiration, so that a great Quantity of this being detained, the Obstructions are still greater in the small Tubes; whereas indeed upon the Account of a more than ordinary Heat, this Discharge ought now to be in an increased Proportion.

SUCH a Disposition of the Blood as this the Ancients call'd *Putrid*; and to speak plainly, it is a Beginning Stagnation, with a

Succeeding Heat and Fermentation.

Nor would it beamis here to take Notice, how unjustly some Authors, having quitted the Consideration of plain Causes for Occult Venoms and Deletirium quid, have brought in the Rio II (something Divine) of Hippocrates (e) to savour their fond Hypothesis; the His best Interpreter Galen, under-

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⁽n) Prognostic. 1. & Galen Comment.

stood by this Expression no such thing as they mean; but on the other Hand, only the manifest Constitution of the ambient Air, such as himself has described in his Aphorisms (f), and which is exactly the same with That We have

been discoursing of.

AND therefore not only does Minadoes rightly Remark (g), that in his whole Epidemicks, Hippocrates never once mentions any Venom or Poison as the Cause of Malignant Diseases; But the Divine old Man himself in another Treatise (h) expressly teaches Us, that All Malidies do equally, or one as much as another, proceed from the Gods, there being nothing more Divine in this than in that, each acknowledging its own Natural and Manisest Cause.

But I willingly wave infifting upon these Heads, as well as the Hints which might be taken from this Theory, of some Use perhaps in the Cure of these Distempers; And leave it to our Physicians to judge upon how good Grounds They do, in Cases of this Nature, under the Notion of Alexipharmicks, give such Medicines as raise a great Heat both in the Stomach and Blood; only pray-

⁽f) Sed. 3. Aph. 11:

⁽e) De Febre Malign. L. r. e. 17 (m)

⁽b) De Aere, Locis, & Aquis,

ing Them to take care, left while They are ingaging the Animal Spirits in War with Malignities, they do fend treacherous Auxiliaries to the supposed weak Party; that is, that they either raise new Tumults and Discorders of worse Consequence than the Original Mischief; or at least, by clogging the Wheels, and throwing Dust upon the Springs of the finest Machine in the Creation, do check and interrupt the Action of Nature (i), when its employ'd about the most Nice and Critical Work.

NEITHER can I, tho, an Occasion be fairly offered, by any means be induc'd to intermeddle in the Controversy of those Gentlemen, who by the help of two Words are made Masters both of Philosophy and Physick; I mean, the Violent Asserters of Acid and Askali. These scanty Principles fall infinitely short of that vast Variety there is in the Works of Nature; However, for their Sakes who are as yet advanced no farther, I will advise the contending Parties (because little Good is got by Quarrelling) to think of a Union, and if they can find no Remedies but out of these two Tribes, to make Use of such as result from

⁽i) Poque News inspot Hippocr. Epid. 6.

a prudent Mixture of some out of Each if this Project does not take, to Resolve however on both Sides, To Distinguish the differing Times of the same Disease, and know, that as, on the one Hand, Acid Medicines are oftentimes as certainly hurtful in the latter End, as they do service in the Beginning of the Fevers; so, on the other those which are Alcalious must necessarily for the same Reason do mischief in the first Periods, for which they are profitable in the last Days of the Distemper.

By what Mechanism this comes to pass They will easily understand, when they have learn'd what Alteration such things as these are, do make in the humane Body; nor will it then be a difficult Matter to convince Them, That He is equally a fond Slave to an Hypothesis, who because Acids are some times of great Service in Fevers, concludes that their Origine is Alcalious; as He who knowing that Stagnating and Fermenting Juices do easily turn to Acidity, from thence Argues that Alcalies are the only Cure of this Stagnation and Ferment.

BUT Dr. Picarne (k) has abundantly demonstrated the Weakness of These Mens

⁽k) Differtatio de opera quam præstant corpora acida vel alcalia in Curatione Morborum. Reasonings

Reasonings, and the Vanity of such Immechanical Theories.

AND here I would put a Period to this Part of the Discourse, were it not that these Diffempers being sometimes Contagious, and Contagion being justly reputed a real Poison, it may be worth the while to examine, a littlewhat this is, and wherein it confifts; more especially, because some may perhaps be apt to think this to be an Argument of an Occult Venom's being the First and Original Cause.

WE are therefore to take Notice, that when a Fever is communicated by way of Infection, from one already Difeated, this most commonly happens in the latter End of the Diftemper, that is, (as we have discoursed concerning the Hydrophobia) when the Fermenting Blood is throwing off great quantities of its active Fermentative Particles upon the Glands of the most constant and easy Secretion; fuch are those in the Surface of the Body, and the Mouth and Stomach, By this means therefore the Liquid of infensible Perspiration, and the Sweat is impregnated with these Midopara, and thus the ambient Air becomes fill'd with 'em; fo that not only as Bellini Argues (1), may fome of there

Effluviainfinuate themselves into the Blood of a sound Person thro' the Pores of the outward Skin, but also in Inspiration thro' the Membrane of the Lungs; for He has in another Place (m) demonstrated how the Air, or something from It, may this way come to be mix'd with the Arterial Fluid; And thus the like Ferment will be raised Here, as was in the Originally Distempered Subject.

This may be One, but there is perhaps another, yet more dangerous manner of Infection, and that is, by the Breath of the Diseased taken in by a By-stander, especially in the last Moments, feizing the Stomack, and fixing a Malignity There. For it is upon this Score, that Those who are Infected do presently complain of an extreme Pain and Nausea in the upper Orifice of the Stomach; and that all Authors do agree in the admirable Use of Vomits timely given in this Cafe: Thefe by their Stimulating Force removing the very Minera of the Difease; and likewise that, oftentimes in Pestilential Illneffes, the Stomach when opened has been found Gangren'd and Mortify'd. This made Van Helmont (n), who had observed this Part in one kill'd by a Plague Infection, perforated and eroded in several Places, no other-

⁽m) De Motu Cordis, Prop. 9.

⁽n) Tumulus Pefris, pag. m. 163 & 172-

wise than He had seen in one Poison'd by Arsenick, conclude, that the Plague for the most Part begins in the Stomach from a coagulated Tarter there.

HEREIN lies the Difference of Contagion, from the first Invasion of Malignant Distempers; the Effects of the One are the Cause and Beginning of the Other; and therefore it is no wonder, if the Symptoms in the former are by a gradual Increase wrought up to their height, they do however in the latter, even at the very first, discover their ill Nature and Violence, and, like a reinforc'd Enemy, by surer Strokes make quicker Dispatch. And this also is the Reason of the great Increase of Funerals in Plague Time in that One Death is thus added to Another.

Is it be difficult to explain the particular manner how the Stomach comes to be thus affected, We must not therefore deny Matter of Fact; and may however probably conjecture, that the last Breath of one dying of a Malignant Distemper proves thus pernicious, in that These fermenting active Particles which, as we just now observed, the Blood discharges upon the Glands of the Mouth, Stomach, Lungs, &c. impregnating the Air in its Passage thro' these; when the same happens to be immediately inspired by a sound Person, it may easily taint the Sali-

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val Juices in the Mouth, which are very Gluttinous, and of a fermenting Nature, and therefore susceptible enough of Contugious Effluvia, but especially of such as proceed from the fame Liquor infected in the Sick Party. Now the Spittle is continually swallowed down into the Stomach, and fo will quickly impress its Labes, or ill Quality, on fo tender and fenfible a Part , that is, will lodge these Corrosive Salts (for which We may Suppose the Particles of Insection) in the Secretory Ducts; whereupon the Glands being obstructed, little Tumours are by the Afflux of their Fluid rais'd here and there, which breaking become small Ulcers, and produce the difinal Train of Symptoms which we have already related.

AND here it may not be amiss to take Notice, that all Authors do agree, One great Cause of Pestilential Distempers, especially in Armies and Camps, to be dead Bodies lying exposed and rotting in the open Air; The Reason of which is plain from what we have been advancing; for Battles being generally fought in the Summer Time, it is no wonder if the Heat acting upon the unbury d Carcasses, and Fermenting the Inices, draws forth those above Particles, which in great quantities filling the Atmosphere, when they are inspired and let into the Stomach, do affect It after the manner already described.

To illustrate this Matter, I shall relate a remarkable Story told me by the learned Dr. Baynard. The Body of a Malefactor was hung up in Chains in the Country; after a few Months, in very hot Weather, it was Sport and Pastime to some Boys playing thereabouts to fwing the Carcafs up and down, One more bold than the rest struck It with his Fift upon the naked Belly, which being outwardly parch'd and dry, and from the falling down of the Humours Swell'd and Tense, was easily burst by the Blow; out gush'd a Water so Corrosive and Fiery, that running down the poor Lad's Arm, it caus'd a violent Excoriation, and a very hard Matter it was to preserve it from being truly mortified. What this Serum could do upon the outward Skin, the more Volatile Parts of It would, without all doubt, Effect upon the more tender and fenfible Membranes of the Stomach, if a confiderable Number of them were fixt there; the Fluids of Humane Bodies being Ranker and more abounding in active Salts than those of other Creatures. which are not continually repaired and nourish'd by the Juices of Animals.

THE Way by which Bad Food, ill-ripened Fruits of the Earth, &c. do oftentimes produce Malignant and Pestilential Diseases, is not very different from That by which we

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have observed Unwholsome Airs to be the Causes of the like Effects. For the Juices with which those do supply the Blood being Corrupted, must necessarily make a Fluid of quite other Properties than what the Animal Œconomy requires, that is, neither fit for Nutrition, nor for the Secretion of those Liquors which in the feveral Organs are to be derived from It; whereupon the [mall Tubes are obstructed by an unequally Glutinous Slime; and it is therefore no wonder, if besides the other Symptoms insuing, Sore Pultules, Inflammations, Ulcers, &c. (more common in Fevers from this Cause than in any other,) are raised in the Surface of the Body.

This is the Ground of the common Obfervation, that a Famine is very often fucceeded by a Pestilence. And this Calamity generally begins among the Poorer fort of People, whose Diet to be sure is the worst.

THE City of Surat in the East-Indies is seldom or never free from the Plague, and yet it is observed, that the English who trade there are in no danger of being insected there by. Now the Chief of the Natives in this Place are Banians, who neither Eat Flesh, nor Drink Wine, but live very poorly upon Herbs, Rice, Water, &c, and most of the Inhabitants do the like, except Foreigners;

This

This Poor Fare, together with the Heat of the Climate, makes them so liable to Malignant Distempers; from the Attacks of which Those who Feed well are more Safe and Secure.

ingers that of the old body triefs, he stake Thus much concerning Poilonous Exhalations and Airs, fo far as the Confideration of the Grotta de' Cani has led Us on to enquire into their Effects; for the' there may be other Alterations of this same Element, differing in their Nature from this we have infifted upon, and yet equally Pernicious and Hurtful, yet We take no Notice of any of them, in regard that those which are from Arfenical, Mercurial, and the like Fumes, are reducible to a foregoing Esfay; and those which are owing to a Change of the known Properties of the Air, may be eafily explain'd by what has been already delivered in This. I shall therefore rather chuse to make some Remarks on the Mischief of another Fluid, which as It is next in use to This we have been treating of, so the bad Qualities of it, when it comes to be altered, must necessarily be almost equally Fatal and Dangerous.

I mean Water, which is of fo constant Service, not only for our Drinks, but also M 4 in

in preparing of our Flesh and Bread, that it may justly be faid to be the Vehicle of all our Nourishment; so that whenever this happens to put on other Properties than are necessary to fit it for this Purpose, it is no wonder if in its Paffage thro' the Body these do make fuitable Impressions there.

Thus at Paris (o), where the Water of the River Seine is so full of Stony Cor, pufcles, that even the Pipes thro' which it is carried, in time are incrufted and fropt up by 'em, The Inhabitants are more subject to the Stone in the Bladder than in most other Cities. The fame I observed in the Baths of Albano, a few Miles from Padua, to that Degree, that it is necessary very frequently to clear the Wheel of a Mill driven by the Current of these Springs, from the great Quantity of petrify'd Matter with which it is from time to time incumbred.

In like manner, let the gross Particles with which the Water is faturated be of any other Nature. Metallick, Sales, &c. thele, according to their various Gravity, the Capacity of the Canals, and fuch like Circumflances, will, when they come to circulate in the Animal Body, be by the Laws of Mo-

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those Mineral Bodies and Nitrous Salts, which abound in the Snowy Waters of the Alps, do so certainly Stuff and Inlarge the Glands of the Throat in Those who Drink 'em, that scarce any who live there are exempted from this Inconvenience (a).

FOR this Reason, the Choice of Water for Drink among the Ancients was by the Weight, the lightest being preferr'd, as most free from

all Heterogeneous Bodies.

is, their having Corrolive Corpuscles mixt with their Water, which cannot fail when forsaken in the Canals of the Body of their Vehicle, to do the same Mischief as they would if taken by themselves undiluted; only with this Difference, that they may in this Form be carried sometimes farther into the Animal Occonomy, and so having pats'd the Prima Via, discover their Malignity in some of the immost Recesses. Thus the Fons Ruber in Athiopia, mentioned by Pliny (b), about which abundance of native Minium or Cinnabar was tound, shew'd its ill Effects

⁽a)Quis tumidum Guttur miratur în Alpibus. Juvenal Satyr. 13.

⁽b) Lib. 31. cap. 2.

170 Venomous Exhalations, &c. cheifly on the Brain; and therefore (c) Ovid fay of it.

Aut Furit aut patitur Mirum gravitate Soporem.

we shall not need then to to enlarge on this Matter, since any of the foremention'd Mineral Poisons may thus impart their deadly Quality to Waters; and accordingly there are Instances of Arsenical, Mercurial, &c. Fountains, of which the Histories may be seen in the Collections of the Learned Baccius (d). And are very remarkable in the Philosophical Transactions (e).

But as We before took Notice concerning Aurs, so it may be worth the while to observe of Waters; that there are some Alterations of them, which tho' not properly Poisonous, yet are of so great Consequence in their Effects, that they may very well de-

ferve to be regarded.

Abuse, committed in this kind about the Roll City; and that is, in the chusing of stagnating impure Well-Water for the Brewing of

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^{· (}c) Metam. lib. 15.

⁽d) De Therm. lib. 6.

⁽e) No. 8.

Beer, and making other Drinks. Such a Fluid indeed has oftentimes a greater Force and Aptness to extract the Tincture out of Malt, than is to be had in the more innocent and soft Liquors of Rivers; but for this very Reason it ought not, unless upon meer Necessity, to be made use of; this Quality being owing to the Mineral Particles and Aluminous Salts with which it is impregnated.

A late Author (f) by fearthing into the Lury first Accounts of the Distemper we call the Scurvy, described by Pliny (g) and Strabo (b), under the promiscuous Names of Stomonace and Scelotyrbe; and examining the Authentick Histories of It in later Years. made by the most observing Physicians in those Countries where it was unhappily revived, as Olaus Magnus, Balduinus Ronfeus, 7. Wierus. Solomon Albertus, &c. finds that the Origine of It was in all Times and Places charged upon the Use of unwholesome stagnating Waters. Then by comparing together the Clavie Strata of the Earth about the Cities of London, Paris, and Amsterdam, He shews that where the Water is worst, there

⁽f) Dr. J. H. Scelera Aquarum: Or, a Supplement to Mr. Graunt on the Bills of Mortality.

⁽g) Lib. 25. cap. 3.

⁽b) Geogr. lib. 6.

this Malady is most rife. So that He has put it out of all doubt, that most of the perplex'd and complicated Symptoms which are ranged under this one general Name, if they do not intirely owe their Birth to the Malignity of this Element, do however acknowledge it to be their main and principal Cause.

AND indeed Hippocrates himself, as He has very plainly decipher'd this (i) Discase, by the Title of subsequipation, or great Milts; so he does very particularly in another Treatise (k), take notice, that Drinking of Stagnating Well-Waters must necessarily induce an ill Disposition both of the Milt and Belly.

If we enquire into the Reason of such 'ill Effects, we must consider, that Clay is a Mineral Glebe, and that the gross Particles and Metallick Salts with which Waters passing thro' such a Bottom do abound, are as Dr. Lister (1) observes, not to be mastered, that is, indigestible in the Humane Body. Not only therefore will these cause, as He very well argues, calculous Concretions in

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⁽i) Prorrhet. l. 2. c. 16.

⁽⁴⁾ De Aere, Aquis & Locis, sub finem.

⁽¹⁾ De Fontib. Med. Angl. P. 2. pag. 75. At fossilia five Metallica salia alia atq; alia sunt, & nobis & pene igni dixeram indomabilia.

the Kidneys, Bladders, and Joints; and as Hippocrates experienced, hard Swelling in the Spleen? but they must necessarily oftentimes by their corrosive Quality twitch and irritate the sensible Membranes of the Stomach and Bowels, and thus hinder and interrupt the Digestion of our Food. Nay, besides all this when they come into the Blood, it is no wonder if the small Canals of insensible Perspiration are frequently stops and obstructed by 'em; for it is upon this Score that Sandorious (m) teaches, that beavy Water converts the Matter of Transpiration into an Ichor, which being retained, induces a Cachexy.

WHAT Mischiess will ensue hereupon every one sees; not only Pains in the Limbs, livid Spots in the Surface of the Body, Uscers, &c. from the Acrimony of the undischarged Moisture, but many besides of those peoplexing Symptoms which go by the Name of Hysterical and Hypochondriaval, may take their Rise from the same Source; for the before-cited Sanctorius (n) has remark'd, that the Flatus or Wind so inseparable from those

⁽m) Medecin. Static. Sed. 2. Aphor. 6.

⁽n) Ibids Sod. 3. Aphor. 16. Flares nil allud quam rude perspirabile.

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tion rude and unfinished.

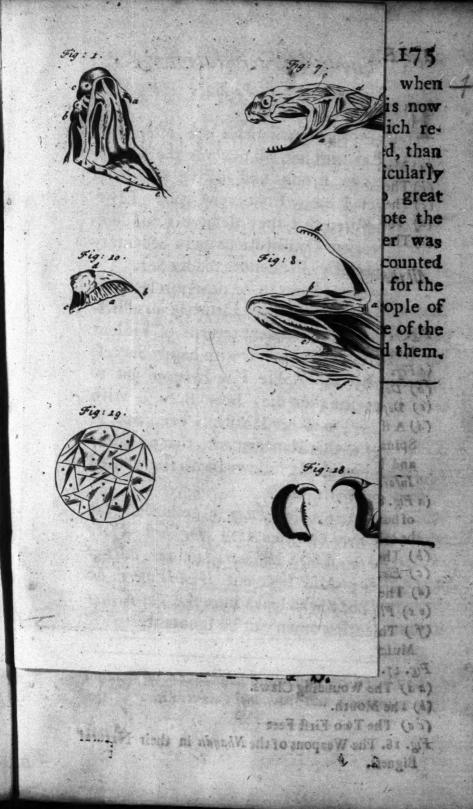
Ir these Inconveniencies are oftentimes not felt, at least not till towards the declining Age, in strong and active Habits of Body; yet I am, from very good Experience, affured that they deferve Confideration in weaker Constitutions and a Sedentary Life, especially of the more tender Sex.

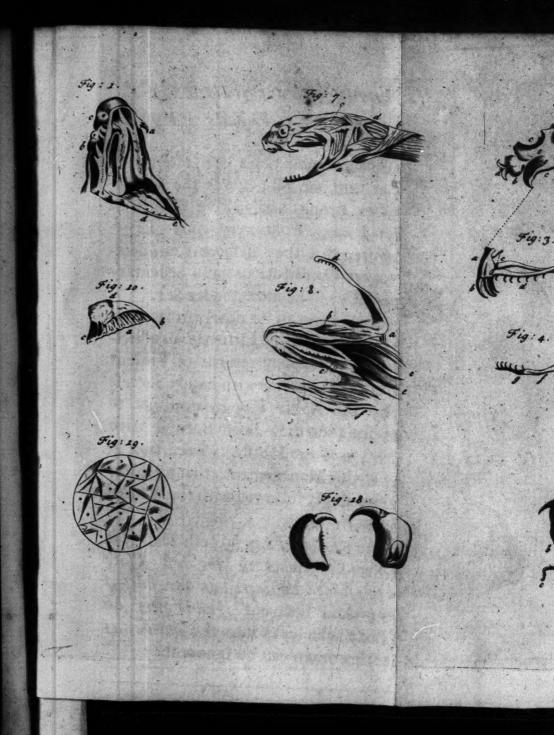
I have the Honour to be nearly related to a worthy Person, who led formerly an afflictand an ed Life from the frequent returns of Violent Cholick Pains, till she was with happy Success advised by the Noble Van Helmont not to Drink (as she then did) Beer Brewed with Well-Water; and her Health is even now fo far owing to this Management, that an Error in It is unavoidably followed with the wonted Complaints.

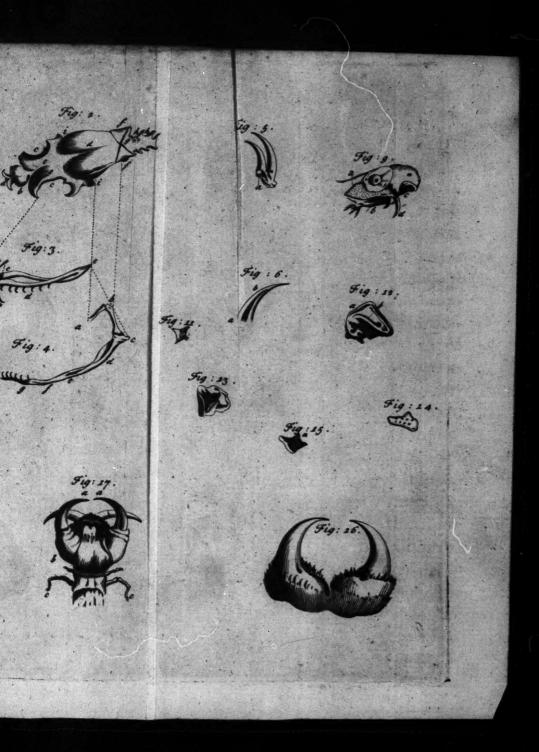
> FOR these Reasons Pliny (o) tells Us, that Those Waters Condemn'd in the first Place which when Boiled do incrustate the sides of the Veffels; And that our Well-Waters do this, no Body who looks into the Tea-Kettles

of our Gentlewomen can be Ignorant.

⁽⁶⁾ Lib. 31. c. 3 Damnantnr imprimis Fontes quorum Aquæ decoctæ crassis obducunt Vasa crustis.







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(6) Lib. 31. c. 3 Damnantur imprimis Fontes quorum Aquæ decoctæ crassis obducunt Vasa crustis.

And indeed in Ancient Times, when —
Physick was more a Science, which is now
more a Trade, as that Part of It which relates to Diet was more carefully studied, than
it is Now-a-days; so this Point particularly
of which we are Treating was of so great
Moment, that Hippocrates, who wrote the
best Book (p) on the subject that ever was
Publish'd, has in a great Measure accounted
not only for the Diseases, but even for the
Temper and Disposition of the People of
several Countries, from the Difference of the
Waters with which Nature has supplied them.

(p) De Aere, Locis, & Aquis.

of both Jaws, terves to pull them backwards, and may be added December Detection Dept. of the Destroff the week.

Spinal speedings of the Second Loredon of the Ivers.

(1 Fig. 8.) A. Mufele which, being fixe to the Extremity

(4) The Extremity of the lower Jaw.
(e e) Phases Capius.
(f) The Internal Part of the Skin covered with found

DESignation Donald Venturals.

FINIS.

(b) the Mouth.

(c) The Two First Feet

Fig. 18. The Wespons of the Magain in their

Muisoiar Fibres.

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The Explication of Those Figures which are not Explained in the Treatife.

I G. 1. Represents the Head of the Viper in its Natural Bigness, with the Mouth open, and Fangs Erefted, vitaleun stont sawant of and

(1) Marks the Poisonous Fang.

(b) The Eye.

(c) The Hole of one Nostril.

(d) The Larynx.

(e) The Forked Tongue.

All the Other Figures relating to the Viper are drawn larger than the Life.

Fig. 7, & 8. Exhibit fome Muscles which serve for the Motion of the Jaws. The Motified Holl Well Warrand

(a Fig. 7.) Elevator Maxilla Inferioris.

(b) Depressor ejusdem.

(c) Depressor Dentis Venenos.

- (d) A ftrong Ligament fastened by one Extremity to the Spinal Apophysis of the Second Vertebra of the Neck, and by the other to the end of the Elevator Maxilla Inferioris.
- (a Fig. 8.) A Muscle which, being fixt to the Extremity of both Jaws, ferves to pull them backwards, and may be called Retraffor.
- (b) The Internal Side of the Depreffer Dentis Venenofi.

(c) Elevator Dentis Venenofi.

(d) The Extremity of the lower Jaw.

(e e) Flexores Capitis.

(f) The Internal Part of the Skin covered with some Muscular Fibres.

Fig. 17. Shews the Head of the Scolopendra.

(a a) The Wounding Claws.

(b) The Mouth.

(cc) The Two First Feet

Fig. 18. The Weapons of the Nhandu in their Natural Bigness,